FOOD MANUFACTURE

Incorporating Food Industries Weekly

LEONARD HILL LIMITED, 17 STRATFORD PLACE, LONDON, W.1 APRIL 1, 1951

CALIFORNIA
APR 22 1952
STATE LIBRARY

Modern food products need modern containers

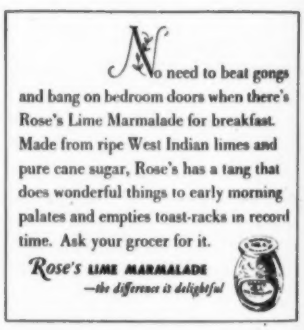
MONO Containers

MONO CONTAINERS LTD · CUMBERLAND AVENUE · PARK ROYAL · LONDON · N.W.10 Tel. ELGAR 404

Let's get some teeth into it!

GETTING 'teeth' into your advertising does not necessarily involve a search for superlatives or the use of the biggest and blackest type. We have used the words 'Amazing New' as often as most people, for at times the old and magic formula is indispensable. But whether we shout, wheedle or whisper, we first make sure that the basic selling theme presents a convincing 'reason why' to the customer. This not only supersedes the brainwaves-and-benzedrine method: it produces better advertising.

'TOPSY'
the talk of the town!
NEW BAKING PROCESS IS POPULARITY-SECRET OF AMAZING NEW LEICESTER BREAD
EVERYONE is asking for 'Topsy'—the amazing new Frears loaf made by a revolutionary baking process. 'Topsy' cuts cleaner and thinner without crumbling—butters smoothly even when new—looks whiter and more appetising—keeps fresh longer—never varies. Yet 'Topsy' is sold at the price of ordinary bread.
'TOPSY'
FREARS AMAZING NEW BREAD
cuts cleaner—butters better—looks whiter
—NEVER VARIES!


No need to beat gongs and bang on bedroom doors when there's Rose's Lime Marmalade for breakfast. Made from ripe West Indian limes and pure cane sugar, Rose's has a tang that does wonderful things to early morning palates and empties toast-racks in record time. Ask your grocer for it.
Rose's LIME MARMALADE
—the difference is delightful

BREAD AND MARMALADE
Two widely different ways we have advertised foods

GRAHAM & GILLIES LTD. *Advertising,* **37 GOLDEN SQUARE LONDON, W.1. (GERRARD 9121)**

FOOD MANUFACTURE

Vol. XXVII. No. 4 · Published Monthly · April 1, 1952

CONTENTS

	Page
Editorial	127
Tomato Purée in Portugal	131
Shrimp Processing	134
Nutritive Values of Fruit and Fruit Juices. *H. E. Magee, M.B., D.Sc., M.R.C.P.*	135
Food Packaging. *John I. Anderton, M.Sc.*	139
World Progress in Fish Canning. Part II. *Mogens Jul*	143
Wheats for Biscuit Flours. *P. Halton, M.Sc. (Lond.), Ph.D. (Cantab.), F.R.I.C.*	149
Correspondence	151
Vitamin B_{12} and Food Production	153
The Evolution of a War-time Ministry	155
Food Developments	157
Trade News	158
Information and Advice	167
Recent Patents, Trade Marks, and New Companies	168

Published by Leonard Hill Limited, 17, Stratford Place, London, W.1. Mayfair 7383.

Subscription Rates: *1 year $6; 3 years $12; payable in advance*

ten years to make a ton!

Have you ever let your thoughts stray back to the days when everything was ground by hand? Then they thought in terms of pounds, not tons, and if the result *was* a bit lumpy, well, you could either take it or — lump it!

Things are very different to-day. Throughout the world, leading manufacturers in such widely varied fields as foods, medicine, cosmetics, paints and printing inks (to mention just a few), have installed Premier Mills and are daily turning out huge quantities of perfectly smooth pastes and emulsions, to any specific and uniform consistency, with a speed and efficiency that would stagger our forefathers.

Our research laboratory is freely at your disposal for consultation and advice.

PREMIER COLLOID MILLS LIMITED

BRETTENHAM HOUSE · STRAND · LONDON · W.C.2

THESE FIRMS choose BRUSH on THESE FACTS

BATTERY ELECTRIC INDUSTRIAL TRUCKS AND TRACTORS

Famous users include:

Atomic Plant—Harwell
Boots Pure Drug Co. Ltd.
Briggs Motor Bodies Ltd.
British Gas Board
B.I. Callenders Cables Ltd.
The British Oxygen Co. Ltd.
British Railways
British Electricity Authority
Chivers & Sons Ltd.
Courtaulds Ltd.
English Steel Corporation Ltd.
Ford Motor Co. Ltd.
Goodyear Tyre & Rubber Co. (Gt. Britain) Ltd.
G.P.O.
G. A. Harvey & Co. Ltd.
Alfred Herbert Ltd.
Imperial Chemical Industries Ltd.
Jaguar Cars Ltd.
Johnson Matthey & Co. Ltd.
Lever Brothers Ltd.
National Coal Board
Royal Naval Armaments Depot (Hoo)
John Walker & Sons Ltd.
Timothy Whites & Taylors Ltd.

A user now operating over 50 trucks once said:

"We have tried everything but now standardize on 'BRUSH'. Put it down to its clever design and low maintenance. Our operating costs have never been so low. Our drivers like them too, an important fact, since no vehicles in other fields of transport are treated with such contempt. Battery changing when necessary for shift is simplicity in itself—about 3 minutes—in fact the manufacturers thought of everything."

'BRUSH' vehicles infallible? NO! But we do offer you an industrial truck as foolproof as is possible and with the highest standard of engineering.

BRUSH TRUCKS ALWAYS PROVE THEIR WORTH

1. The cheapest but largest selling unit in its field.

2. 10,000 'BRUSH-BRED' vehicles have proved their worth in post-war years.

3. Up to 2 ton loads or 6 tons towing with 'BRUSH' tractors.

4. Fixed or elevating platforms —high or low loaders.

5. Direct tiller steering.

6. Totally enclosed iron-clad power unit.

7. Newton-Bennett hydraulic elevating gear.

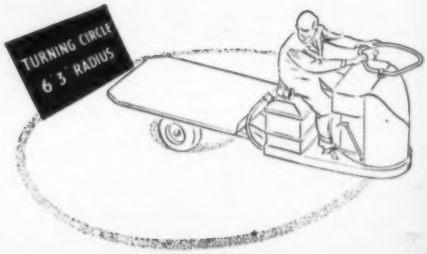
8. Very low maintenance — direct finger contact control.

9. Orthodox accelerator, brake pedal and hand brake for parking.

10. Will operate continuously for 8 hours on one battery charge.

11. Running cost for full day—8d.

12. Backed by one of the largest engineering organisations in the world.



Distributed by

HENLYS *England's Leading Motor Agents*
(MATERIALS HANDLING DIVISION)
HENLY HALL, OSNABURGH STREET, LONDON, N.W.1. *Telephone:* EUSTON 4273

Manufactured by **BRUSH COACHWORK LTD. Loughborough, England**
Tel: 3131 Loughborough. Grams: Brushcoach, Loughborough

FOOD MANUFACTURE

Vol. XXVII, No. 4 April 1, 1952

Labelling of Tomato Products

THERE has been some confusion about the labelling of tomato products, according to Mr. H. H. Bagnall, Birmingham's City Analyst, who found that a sample of "Tomato Piquant" contained only 3·9 per cent. tomato solids. According to the Food Standards (Tomato Ketchup) Order, tomato sauce and ketchup must contain at least 6 per cent. tomato solids; this sample had the appearance of tomato sauce and, although of inferior quality, was in fact tomato sauce in everything but name. The manufacturers, when communicated with, expressed the opinion that the Order referred only to ketchup, sauce, or relish. They had, in fact, submitted their label to the Ministry of Food, who had approved it, and this was confirmed by the analyst.

In commenting upon this case, Mr. Bagnall says: "Apparently the Ministry of Food is having some difficulty with products of this type, and although the whole question is being reconsidered, no solution of the problem has yet been found."

The so-called "Tomato Piquant" was really a tomato sauce with one-third of the solids missing. What is to prevent the final absurdity of a sauce containing (say) 0·02 per cent. of tomato solids being described by some fantastic name such as "Bon Tomato"?

We agree with Mr. Bagnall when he says that it seems a pity that after so much time and effort has been spent in the formulation of food standards, it should be possible to by-pass the Order merely by using another descriptive name.

In the Balance

MORE is probably known about the relationship between animal output and diet than about the similar relationship for human beings. There has certainly been much glib comment in post-war Britain about diet and energy, about rations and productivity.

This year, nearly two hundred factory employees in Slough have been taking part in a month's "food and health" investigation organised by the Ministry of Health on behalf of the Medical Research Council. Spring scales were issued for use at home to weigh every scrap of food eaten. Every mile of walking or cycling as well as their expenditure of energy at work was logged.

Is it true that the fuller and more varied American workers' diet gives more stamina and thus their much publicised superior productivity? This is one of the questions this type of survey is expected to answer.

We can only hope that the answer will not produce embarrassing questions for the Minister of Food, or even for the Chancellor of the Exchequer! Nevertheless, it is a most commendable attempt on the part of the Ministry of Health to arrive at the fundamentals of a difficult scientific problem, especially at the present time.

Applications of Filtration

AN article on filtration by E. L. Streatfield, B.Sc., F.R.I.C., M.I.Chem.E., published in *International Chemical Engineering and Process Industries*, **33**, 2, 53 (now changed in name to *Chemical and Process Engineering*) deals with its fundamental principles, equipment, and applications.

The author has covered a wide field, and discusses the more important papers published during the last twelve months, although some earlier references are included.

The food industry is among those in which filtration plays an important part, for example in the manufacture of sugar, meat extract, salt, and edible oils.

Filtration processes have been used for a very long time, but the amount of experimental data being collated in the laboratory with a view to the selection of commercial plant is surprisingly large.

Apart from this aspect, new types of filter of numerous kinds are in commercial use and the author gives a number of examples of these together with working details.

Colonial Development Corporation

IN the last paragraph of the note headed "The Passing of BETRO," which appeared in our March issue, a reference to the Colonial Development Corporation was inadvertently included.

In view of the implications which could be read into the statement, we withdraw it unreservedly. The Colonial Development Corporation maintains its operations throughout the Colonial Empire.

The Fat Cuts

SINCE the publication of our last issue, a cut in the allocation of fats for flour confectionery from 75 to 42 per cent. of their datum usage has come into effect. This was first announced by the Minister of Food in the House of Commons on November 29, 1951, when he said that the reduction of imports of oils and fats would involve very heavy cuts in trade allocations, and that only by this means could the domestic ration of margarine and cooking fats be maintained.

At the time of this writing, it is the avowed intention of the Parliamentary Committee of the Bakers' National Association to send a strong protest to the Minister and to ask him to meet a deputation to discuss the matter.

The view of the bakery industry is that while they are willing to support the Government in its efforts to meet the national economic crisis, it is unfair to expect them to bear an unduly heavy proportion of the total burden. Letters from local associations all over the country have already reached the N.A., in which the almost unanimous opinion was expressed that the reduction in confectionery output, which has so far subsidised bread losses, means virtual extinction for many small bakers and would result in unemployment in the baking trade. The cuts were stigmatised as savage ones which penalise the small baker. The crux of the matter seems to lie in the feasibility of reducing the present domestic ration of fats, as such, for the whole of the population. It is true that such a reduction might be partly compensated for by the eating of cakes but it is not everybody who buys shop cakes. As the trade is unanimous in its views on the cuts and has doubtless taken into account the domestic side of the picture, its case does not appear unreasonable. Further developments will be awaited with interest.

Fifty Years of Hydrogenation

THERE have been many developments in the industrial aspect of hydrogenation since Normann took out his patent in 1902. The "hardening" of oleic acid was first attempted using phosphorus and iodine and then potash fusion, the latter actually being worked by Radisson at Marseilles. Liebig, Fokin, and others experimented on palladium and platinum as catalysts; Mond hinted at nickel in 1888—but rather for dehydrogenation uses.

Sabatier and Senderens then began their classic experiments on hydrogenation of unsaturated compounds, though these referred to the vapour phase, while in 1901 the patent of Senderens specifying nickel also mentioned palladium, cobalt, or iron, and was still rather academic in outlook since such reductions as nitrobenzene to aniline were envisaged.

All credit must thus go to Normann for using nickel in the hydrogenation of liquid oils as an alternative to vapour phase methods, for studying nickel on inert carriers or supports, and for demonstrating nickel powder as a catalyst when formed *in situ* from nickel oxide suspended during hydrogenation. Normann converted oleic to stearic by this means, and also treated the fatty acids of tallow to yield an acid with iodine number 10 in place of the original 35. In studying hydrogenation by nickel acetate, formate, stearate, and oleate, he found the pure acids liberated; hence his conclusion that free nickel must be liberated before oil hardening takes place.

That the food industries owe much to Normann with his practical outlook is realised by further references to his studies of the nickel content of hydrogenated oils and of methods of removing nickel. He proved that only two parts nickel per million were present in treated oils, that is, no more than in oils treated in nickel-lined plant. Normann's nickel kettle for this work and his estimations with dimethylglyoxime round off a remarkable harnessing of the one-time "Old Nick's Metal."

Apple Juice

THE reply of Dr. Charles Hill, given at the end of a recent Adjournment debate in the House of Commons at which Wing Commander Eric Bullus asked for sympathetic help in the development of the apple juice industry, will be disappointing.

There was obviously no real point to be gained by Dr. Hill in comparing apple juice with blackcurrant juice, for no claims have ever been made for apple juice as a source of vitamin C. His reference to the lower potassium and sodium contents of apple juice compared with other fruit juices can obviously be countered by the fact that the former is taken neat, whereas those from more acid fruits need considerable admixture with sugar and water prior to consumption, but he was probably right in saying that the real value of apple juice was to give satisfaction to those who require a refreshing drink, and he was probably equally correct in regarding the cost as one of the chief deterrents against increased sales.

It seems, however, to have eluded the minds of the Ministries concerned that the industry was introduced solely as one means of economically avoiding wastage of what was admitted by Dr. Hill to be a useful food material. The apple juice industry has struggled with a very large problem for fifteen years. The lack of advertising has meant that 99 per cent. of the public have never seen, tasted, or heard of it.

Here is an industry struggling to make use of a raw material which is otherwise going to waste. Here also is a Government admittedly concerned about the economical use of any home-produced raw material, and the problem is and will remain that of bringing the two together.

What was really so disappointing in Dr. Hill's

speech was not so much what he said as what he did not say. Having replied in detail to the specific points which were put up by Wing Commander Bullus, and in a negative form in each case, it would have been more useful had he proceeded to indicate that the Government thought that they themselves had some interest in this problem and that they could not just sit and watch this annual wastage.

It may be that the manufacture of apple juice is not the only solution. Fifty thousand tons of apples represent a major problem which undoubtedly is beyond the capacity of the present industry to solve unless it gets some aid from the Government. How good it would have been if Dr. Hill had finished up by saying, "We cannot help you in the various ways you have suggested, but let us get together and see if there are any other possible solutions to this problem." That would have been statesmanship, and instead of a horrible vacuum there would at any rate have been a further chance of investigation on a joint basis.

America has produced large quantities of de-acidified apple concentrate merely for the flavouring of tobacco. Could not the possibility of making and using a similar product in this country be considered, not for that purpose but for feeding the population?

Perhaps the Ministries of Food, Agriculture, and Health will think again in the national interest.

Food from Cotton

THE cotton crop has long contributed its share to the world's food. Oil extracted from the seeds has a number of nutritional uses and the residual press cake material has been used to a limited extent for animal feeding.

Research work now in progress in the United States seems likely to expand very appreciably the amount of cottonseed meal that can be safely fed to farm cattle and poultry. Hitherto it has been considered necessary to keep the amount of cottonseed meal fed below 9 per cent. of the total protein intake of animals, owing to the presence in it of certain growth checking substances; one such substance is the yellow pigment in cotton seeds.

Scientists of the U.S. Department of Agriculture have found that heat treatment prevents these substances from exerting their inhibiting effects. This treatment would seem to need careful control; there is an optimum temperature range within which the maximum "killing" of the growth checking substances is obtained, with minimum damage to the proteins.

Meal from the 1951 cotton crop has been experimentally processed in ton quantities and final feeding tests are now taking place. It is anticipated that the new process will be used by a number of mills for the 1952 crop.

For the Southern States of America this development is likely to be of major economic value. Owing to the soil eroding tendencies of the cotton crop, more and more stock farming has had to be introduced, but feedingstuffs have had to be imported from other areas. However, any process that enables a fuller nutritional use to be made of cotton crop residues has world-wide significance. Egypt and the Sudan, Brazil, Mexico and other South American countries, India, and British East Africa are all producers of cotton. Most of these parts of the world are less well endowed with animal and poultry feedingstuffs than the United States.

What is Packaging?

THE argument put forward by Mr. A. F. Cowan in his talk to the members of the British Sales Promotion Association was that to make a product and to package a product constituted one operation. There was no such thing as the packaging industry. To talk about it was to sow the seed of packaging problems. It should not be set up as something apart; far better try to absorb it as part of the process of making the product. Until the man who made something accepted the fact that it was not made until it was in its box and delivered safely there would never be peaceful packaging.

A lot had been said, said Mr. Cowan, about the relationship between packaging and self-service retail selling. It was misleading to harp unduly on the need to design special packages for this purpose. Self-service was the ultimate end of packaging. Tracing the origins and development of grocering to the self-service stores of today, Mr. Cowan said that these were not hypnotic. The so-called "impulse selling" was not based on confronting the shopper with a well displayed but hitherto unknown article. His mind was conditioned to this confronting operation by the advertising. What the shopper encountered was not just a product, but something already introduced and familiar. This link in the chain facilitated acceptance; the display in the store translated this acceptance into an impulse to buy. It was not merely a question of catching the eye with a package; that was the end of the process and no more than that. All that self-service retailing did was to put a premium on good packages and packaging.

Commenting on the American approach to packaging, Mr. Cowan (who had toured the United States in 1949-1950 as secretary of the Anglo-American Council on Productivity Specialist Packaging team) said that if we made the mistake of isolating packaging as something standing on its own, it was only a short step to parcel it out and to qualify it "American Packaging" or "Patagonian Packaging" and so on. American packaging should be studied in its own context, *i.e.* as a facet of American production,

American merchandising, and the American temperament. Americans did not buy packages; they bought the goods wrapped up in them, but they did expect to find value for money in the package as well as the product.

We could not capture the American idiom just by putting our goods into American style packages. The Americans made little use of counter display cartons but it was a trap for the unwary to assume either that they did not believe in them or that they had never thought about them. The reason for their apparent neglect of an effective sales aid was that they had not yet found a way of assembling, loading, and closing display cartons mechanically at high speed.

Many American packages were not significantly different from ours, but what was not always apparent was the low cost of wrapping them around the article. A good illustration was the glass bottle in which strained baby foods were packed. Intrinsically it was not novel, but it was made to a high degree of precision and thus was consistent both in dimensions and performance. These characteristics were not necessarily apparent from the examination of a few specimens but they were the foundations on which a process of filling, capping, sterilising, cleaning, labelling, and packing at speeds of 500 per minute were being achieved today. This high production efficiency was much more important than anything else.

Turning to the subject of British packaging, Mr. Cowan suggested that it was a wise policy to avoid copying the American type of packaging for British goods. Although the mechanics of wrapping them up for the U.S. should conform to American practice generally, it should be borne in mind that an imported article carried respect for traditional qualities and that the Americans wanted it to look imported and not to look American.

However, if we were going to reproduce the American product, then by all means it should be a true copy of the American package. But, when copying, what would not be seen was the very low cost in the U.S. of the operation of putting the product *in* the package. No package or package material which did not lend itself to high speed packaging ever made its mark in the consumer goods market.

Billy Bunters

THE television serial on the Fat Boy of Greyfriars has been criticised because it fails to make the most of the character. The feature, however, leads us to realise one sign of the times—the decline of the fat man. As in the case of the Cent Kilos Club of Paris, dissolved in the war years of rationing because its members one by one fell below the 16 stone minimum, so the austerity of post-war years in most countries has reduced the girths of most of their fat men.

Those seeking the causes of corpulence ascribe it mainly to gorging, as Billy Bunter gorged, or, going back to fact instead of fiction, as Gabius Apicius gorged when he spent £800,000 on his stomach, yet despaired of ever satisfying its cravings. Modern ideas have recognised the existence of faults in metabolism, as was foreshadowed by Boswell in conversation with Dr. Johnson. In reply to the doctor's dictum that a fat man ate too much, Boswell replied: "I don't know, Sir, you see one fat man who eats moderately, and another who eats a great deal."

Leaving the physical angle, it would appear that there are two schools of thought regarding obesity. The sayings "Fat and merry, lean and sad" and "Laugh and grow fat" represent one side, a viewpoint emphasised by Caesar's cry for dependable fat men rather than the lean, plotting kind. A New York insurance company found on investigation that honesty and stoutness are linked and that collectors in their employ who already possessed pounds avoirdupois could be trusted with pounds sterling.

An opposite view is that the pot-bellied profiteer pointed to a kinship between obesity and financial duplicity. Still another that "fat paunches have lean pates." Said a Lord Chesterfield: "Fat and stupidity are looked upon as such inseparable companions that they are regarded as synonymous terms," thus defining the epithet "fat head" used by generations of Billy Bunter's schoolfellows.

If it ever be written, the history of fat men would contain many striking instances. Of Bonaparte becoming corpulent on St. Helena; of William Banting, who sought a more elegant line by means of his now famous diet. The story would be brought up to date by such titbits as the Hungarian edict that on municipal transport undertakings stout people must travel more expensively, with a surtax on anyone occupying "more than the scheduled space."

In view of the indignation produced by the recent increase in fares, perhaps this might be worth a thought on the part of London Transport.

OUR JUBILEE NUMBER

THE June issue of FOOD MANUFACTURE will be a special one celebrating the 25th anniversary of its formation in 1927.

The editor would be pleased to receive short articles or notes from any contributors and subscribers to FOOD MANUFACTURE in its early years. Comments on conditions of the industry at that time and comparison with those of the present day would be welcomed.

To ensure publication, contributions should be received on or before April 18, 1952.

Tomato Purée in Portugal

The history of the firm of Industrias de Alimentacao Idal Limitada is one of persistence and determination on the part of its director, Mr. J. M. Giralt. Nine years ago he started a factory in Portugal for the production of hydrolysed protein and gravy cubes and, in 1946, began making tomato purée. Not being satisfied with the product, Mr. Giralt closed down for a whole year in order to install new plant and entirely reorganise his factory, which is now equipped and conducted according to the latest advances in tomato purée production.

An aerial view of the tomato purée factory of Industrias de Alimentacao Idal, at Vila Franca de Xira.

THE factory is situated in the Ribatejo Region of Portugal on the outskirts of a small town, Vila Franca de Xira, about 20 miles from Lisbon.

This region, favoured with a spongy soil, watered by the River Tagus which during heavy rains floods the adjacent plains, is ideally suited for the cultivation of rice, melons, and tomatoes. It was for this reason that it was decided, in 1946, to open a section for the production of tomato purée.

It became apparent that the first production packed in 1947 was unsatisfactory, as the recent construction of the factory, combined with the old-fashioned methods used, were inadequate to produce an article with the characteristics required by modern food legislation.

Operations Suspended

Mr. Giralt and his colleagues did not hesitate. They suspended all production during 1948 to allow them to carry out an exhaustive study of the best means of modernising the factory and of radically modifying the methods used hitherto. As a result, it was decided to adopt the most advanced methods of the Italian and American packers.

A New Factory

All copper equipment was scrapped and replaced by stainless steel plant which was adapted and improved upon in accordance with the directors' own ideas.

The packing of tomato purée was resumed in 1949 with a small trial production. The change of methods gave the desired results, the purée being approved by the first users on the score of its high quality. Not only was this attributable to the methods employed, but also to the high sugar content and other qualities of the tomatoes grown in the region which gave the finished product the flavour and sweetness of Hungarian purées.

Nevertheless, the directors were still not satisfied and made every endeavour further to improve the 1950 pack which, owing to its general characteristics and by reason of its low mould count, was graded as first class by all the principal official laboratories in Europe as well as being approved by the Food and Drug Administration of the United States of America.

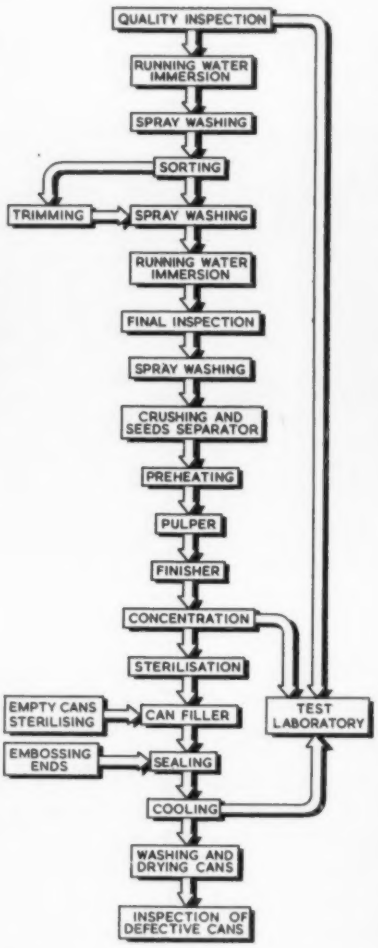
In the months of December and January, the company places its contracts for the raw material with the growers, to whom it distributes, after careful selection, seeds

Motor transport and horse-drawn wagons arrive at the factory with the freshly picked tomatoes from the nearby fields.

After unloading and weighing, the tomatoes are washed in a tank of running water.

Tomatoes are conveyed from the first washing tank to the sorting house and receive their second wash.

When the elimination of defective fruit has been completed, the tomatoes are trimmed.



of the Marglobe varieties of tomatoes, to ensure a crop of uniform quality.

Manufacturing Methods

The quality and characteristics of the fruit are carefully inspected in the reception bay as soon as they are received, first deliveries being made at the end of July when the season starts. The growers are supplied with the necessary crates for the transport of the tomatoes.

Immediately after inspection, the tomatoes are washed in a tank of running water whence they travel by endless belt fitted with stainless steel containers to the sorting house, receiving on the way their second spray washing. Conveyed by means of a stainless steel mesh belt, the tomatoes then pass between a row of trained personnel who pick out the defective fruit. To enable this important process to be carried out efficiently, each team of inspectors is changed

The whole and trimmed tomatoes are lifted mechanically and undergo their fifth and final wash.

The tomatoes go to the crushing machine which, at the same time, separates the seeds.

After preheating, the tomatoes proceed by gravity to the pulper and finisher machines.

every two hours; to facilitate the work and to ensure that all unfit fruit is removed, special attachments fitted to the stainless steel conveyor turn the tomatoes over. Each individual tomato is thus carefully inspected.

The wholly sound fruit pass on their way, being washed for the third time in copious water sprays while the defective tomatoes pass through to the trimming section, where they are again sorted and subsequently trimmed, all unfit portions being discarded.

Both the whole and trimmed tomatoes are subjected to a fourth wash by immersion in running water and are further inspected by operators before passing to the machines. From this moment, the tomatoes are no longer touched by hand. Lifted mechanically, in stainless steel containers, they undergo the fifth and last wash by water sprays and then fall by gravity, finding their way to the machine which performs the double operation of crushing the tomatoes and separating the seeds from them.

This latter operation prevents the seeds, on being heated, from contaminating the purée with their bitter taste which would occur should they pass through the pulper. In addition, the microscopic hairs on the seeds are prevented from mixing with the pulp. Moreover, the separation of the seeds before pulping prevents the inclusion in the purée of the mucilaginous substance which normally adheres to them, the presence of which gives a false impression of higher density.

Concentration of the juice is carried out at a temperature of 50° to 55°C. in the stainless steel vacuum pans, evaporation at this temperature ensuring the retention of the natural organic properties of the fruit.

After crushing, the tomatoes are preheated at a temperature of 60° to 70°C., controlled by a recorder. They then proceed by gravity to the pulper with a 0·9 mm. mesh and then to the finishing machines with 0·7 mm. mesh, where they are converted into "cyclone juice." This juice is drawn by vacuum into a small stainless steel tank, the vacuum in the pans being utilised for this operation.

The concentration of the juice is conducted at a temperature of 50° to 55°C. in the stainless steel vacuum pans, the evaporation at that low temperature ensuring the retention of the natural organic properties of the fruit. The dry solids content of the purée is controlled by direct reading refractometers attached to each vacuum pan.

The purée is again checked by hand refractometer in the production manager's section and finally it is tested in the laboratory for acidity, colour, and invert sugar. Bacteria and mould counts are also made.

After filling, the cans of tomato purée are sealed and put into a tank of running cold water for cooling, prior to cleaning and storage.

The Filling Section

Immediately after concentration, the purée is conveyed to the filling section in completely enclosed stainless steel containers, in which it is sterilised.

The empty cans are sterilised by means of steam sprays and the can-filling process is commenced once the product has reached 90°C., the sterilisation temperature, this temperature being kept constant by thermostatic valve, and controlled by a recorder.

Preparing Cans for Export

After sealing in semi-automatic machines, the cans are cooled in a tank of running water. They are then removed for cleaning and are finally placed in cases according to the embossed marks on the tops. The goods are sold under the trade mark "Guloso."

Before shipment the goods are

(*Concluded on page 152*)

Shrimp Processing

ALTHOUGH the processing of shrimps is a relatively small industry in British Columbia, an increasing consumer demand has stimulated requests for information on procedures for canning, freezing, and the utilisation of shrimp wastes. Because of this general interest, a review of the investigations conducted by the staff of the Pacific Fisheries Experimental Station has been summarised by A. W. Lantz.

Washing and Heading

After the shrimps are removed from the nets, either one of two procedures has been followed. They are thoroughly washed in sea water and packed in ice or are washed, heads removed, washed again, and then stored well packed in ice. The latter procedure is favoured, particularly for canning processes, since shrimps stored without removal of the heads have a tendency to become discoloured. Removal of the heads extends the storage life of the uncooked shrimps by two days.

In experiments conducted at the Station, it was found that washed shrimps with heads on could be stored in ice for a period of three days without deterioration while washed beheaded shrimps could be stored in ice for a period of five days.

Importance of Sanitary Control

It cannot be over-emphasised that sanitation procedures must be rigidly controlled and that shrimps, because of physical fragility, require great care in handling. Processors have felt that insistence on this handling procedure discourages fishermen from fishing for shrimps. Consequently, the usual practice has been to have the shrimps well washed upon removal from the nets, packed in ice, and delivered to the plant within two days of capture.

Canning of Shrimps

At the cannery the shrimps are thoroughly washed, beheaded if necessary, and again thoroughly cleansed of stomach fluids and slime. The most commonly used procedure is to cook the shrimps in boiling water for three minutes, remove the shells, pack in ½ lb. cans, fill to top with hot 3 per cent. salt solution containing 3 per cent. citric acid, seal, and process for 35 minutes at 240°F.

Fresh Shrimp Meats

Shrimps for retail trade are usually frozen while fresh. Picked shrimp meats are dipped in 30° salinometer brine for approximately one hour. They are then drained, packed in 5 lb. cans, and placed lids down (inverted position) on the freezer plates. In the cabinet freezer designed by the Pacific Fisheries Experimental Station for a small plant, 800 lb. of fresh shrimps are frozen in eight hours. The frozen product is then delivered by road to nearby towns for storage, or directly to the retail trade.

An excellent fresh shrimp product can be made by packing beheaded raw fresh shrimps in the shell into cans, flooding with water, and freezing. Shrimps processed in this way were stored for periods up to nine months and were of excellent flavour, colour, and texture when cooked.

Shrimp meats have more recently been dipped in 30° salinometer brine, drained, packed in moistureproof bags, the air removed by tap-water aspirator, the bags sealed, and then frozen. These packages are attractive in appearance, neat, and compact. The bag gives protection against oxidation and loss of moisture.

Utilisation of Shells

Investigation of the expression "shrimp meals" has revealed that the term has been applied in British Columbia to a number of products which, though quite different in character, are dried by-products of the shrimp industry. Shrimp meal may be a ground mixture of dried undersized shrimps plus shells from processed shrimps, or dried shrimp shells containing negligible amounts of shrimp meats. The latter should be called "shrimp shell bran" since it contains very little, if any, meat. Shrimp meal may be used in the manufacture of animal, poultry, or hatchery feeds.

Shrimp Shell Bran

The shrimp shell bran and shrimp meals are prepared from shells and wastes dried in a tunnel. Special trays were made for shrimp drying by fastening hemp sacking to the racks instead of the usual wire netting. Sawdust was used as fuel and drying time averaged 12 hours. The dried shrimp and shells are then ground into a meal or gently crushed by hand to separate shell from dried meats.

One means of further separation is by the use of a grain cleaner. These cleaners are commonly known as "fanning mills" and are used to remove chaff from grains.

Oils and Fats

THE production, refining, and uses of oils, fats, and waxes are dealt with in a new book,* written in German, which is designed to interest all who are in any way connected with oils and fats. It is a book of general information rather than an authoritative discussion of a particular field.

In the first section the author deals with vegetable oils and fats, including oil-bearing plants, the processing of oil seeds, and the refining of oils and fats. In his next section he deals with milk and milk products, next with animal oils and fats, and then with waxes. Next comes a series of short chapters on petroleum- and coal-derived oils, essential oils, edible oils and fats, margarine, soap, glycerine, sulphonated oils, paints, stearines, oils and fats in textiles and in the leather industry, lubrication, protective oils, and, finally, a section on international trade in oil seeds and oils.

This very brief summary of the contents shows that the book is emphatically not one for the specialists but rather one for those desiring general information on the subject.

* *Die Öle und Fette in Wirtschaft und Technik*. By P. F. Rickmers. Pp. 272. Ziolkowsky, Augsburg. D.M. 16.50 net.

Nutritive Values of Fruit and Fruit Juices

H. E. Magee, M.B., D.Sc., M.R.C.P.

There is surprisingly little direct information about the nutritive value of fruit and fruit juices except on their vitamin contents. In some Continental countries, however, fruit purées and juices and fruit diets have long been credited with beneficial effects in a variety of diseases. It therefore seems opportune to assess the available information and to try to place fruit and fruit juices in their proper place in a nutritional sense.

DURING the past 30 years or so rapid advances have been made in the manufacture of fruit juices and there are now on the market pasteurised natural juices and syrups of most of the fruits grown in Britain which retain the original flavours.

The great bulk of the juices now obtainable are "straight" (*i.e.* unconcentrated) juices, derived from a single species or even from a single variety of fruit. For instance, juices differing widely in taste and flavour have been prepared from different kinds of apples, and the juices of different varieties have been blended to bring out particular characteristics. Similarly, juices from different species of fruit have been blended, *e.g.* the apple and raspberry, producing variety in flavour and colour. The scope for variation along these lines is wide.

Concentrated juices, convenient in many ways but with the disadvantage that some of the natural flavour is lost in concentration, have also been prepared. Syrups are especially convenient for making up drinks of varying dilutions and because of their high sugar content they will keep at room temperatures for several days after opening. Straight or concentrated juices without added sugar will spoil after exposure to the air unless kept in a cold place.

Consumption in Europe

In recent years fruit juices have been consumed to an increasing extent in many countries; in certain parts of Europe, especially Switzerland and Germany, consumption before the war had reached phenomenal heights. For instance, in Switzerland production of apple juice was 3·5 m. gallons in 1939 and 6·9 m. gallons in 1950. In Germany in 1939 consumption reached the huge total of 27 m. gallons. Most of the juices drunk in these countries were those of native fruits. In Britain, apart from citrus juices, consumption has been limited mainly to relatively small quantities of soft fruit juices used to flavour milk shakes and ice creams.

In Switzerland and Germany apple juice predominates. These native fruit juices are free from alcohol and as a rule they are pasteurised or otherwise heat-treated, so that they will keep indefinitely unless exposed to air and warmth.

Composition of Fruit

Fruit has been eaten by mankind from time immemorial, a fact significant of its health-giving value. The notion generally held about fruits was that with few exceptions they did not possess outstanding nutritive properties, but rather that, when combined with foods of higher nutritive value, they formed a pleasant and tasty item in the diet. Fruit has also been valued because it stimulates the movements of the gastro-intestinal tract.

The discovery of the vitamins, the advances made in knowledge of metabolism, and the significance of the mineral elements and of the acid-base equilibrium of the blood have all tended to give fruit a new importance nutritionally. Chemical analyses of fruits have been accumulating and, in addition to their vitamin contents, they have been shown to be relatively rich in basic elements bound to such organic acids as citric and acetic. Many of these organic acids are oxidised in the body to carbon dioxide and water, thus leaving the basic elements to add to the alkali reserves of the body. To this property the protective value of fruit is partly due.

Most fruits are rich in potassium, and contain appreciable amounts of sodium, calcium, iron, magnesium, and of the trace elements—iodine, fluorine, copper, manganese, etc. Some, such as dates, blackberries, currants, and raspberries, are particularly rich in calcium, and some, such as figs, dates, loganberries, and peaches in magnesium.

Deficiency states, owing to lack of any of the mineral elements which occur in appreciable amounts in fruits except calcium and iron, are practically unknown, and this fact has doubtless detracted from the importance ascribed to these foods. The relationship recently shown to exist between the functions of the adrenal cortex in regard to the metabolism of sodium and potassium, and the beneficial effects of sodium chloride in Addison's disease, have served to demonstrate the physiological significance of these elements.

Vitamin Contents

The fresh fruits normally consumed in Britain yield from about 5 to 15 Calories per oz. or 80 to 240 Calories per lb.; their protein content is negligible. It is for their vitamin content, especially vitamin C and carotene, that they are chiefly prized. All contain vitamin C, but the content is extremely variable, from about 1 mg. per oz. for certain types of apple to about 57 mg. for blackcurrants; the blackcurrant is the richest of all our native fruits in vitamin C, and has no equal in this respect among imported fruits eaten in Britain. Most of our native fruits also contain significant amounts of the B complex. The composition of some common fruits and the corresponding juices is shown in the Table.

The content of nutrients in the juice is frequently higher than in

COMPOSITION OF SOME FRUITS AND JUICES

Fruit	Calories per oz.	Na mg. oz.	K mg./oz.	Ca mg. oz.	Mg mg./oz.	Vitamins: Carotene I.U./oz.	Vitamins: B_1 mg./oz.	Vitamins: C mg./oz.
Apple	11	0·6	35	1·0	1·0	17	0·01	1-4
,, juice	14	2·0	25	2·0			0·003	2-5
Blackberry	8	1·1	59	18·0	8·4	~90	0·01	Tr.
,, juice	6							Tr.
Blackcurrant	18	0·8	106	17·2	4·9	9-90	0·01	57
,, juice	12	0·9	70	8·4	3·4			28-85
Gooseberry	10	0·3	48	5·2	2·4	6-60	0·01	7
,, juice	8							6
Orange	10	0·8	56	11·7	3·7		0·02	16
,, juice	15	0·5	51	5·0	3·0		0·03	8-18
Victoria Plum	11	0·5	53	3·1	2·0	30-120	0·01	1
,, ,, juice	15							3
Raspberry	7	0·7	64	11·6	6·2	14-80	0·01	7
,, juice	8	0·6	44	4·0	3·4			7
Strawberry	7	0·4	46	6·3	3·3	20-200	0·01	14
,, juice	4	0·9	44	4·5	2·5			14

the whole fruit. For instance, 100 g. of apples yield 34 Calories and 4 mg. of calcium compared with 50 Calories and 6 mg. of calcium for the same weight of juice. On the other hand, pasteurisation reduces the vitamin C content significantly.

Therapeutic Evidence

No animal experiments to ascertain the all-round nutritive value of fruits or fruit juices, or their value in regard to particular nutrients other than vitamins, are known to the author. Investigations on these lines would be well worth while.

In Britain the notion that fruit juices are beneficial nutritionally has never been put forward with conviction and authority; it is held only vaguely and only in respect of vitamins have they been commended. For this reason fruits like apples, which are relatively poor in vitamins, have been rated very low in a nutritional sense. Indeed, during the late war when there was some uncertainty about the sufficiency of vitamin C in the national diet, views were often expressed, which must now be regarded as somewhat extravagant, about the low food value of the apple in particular. It was termed a "filler" the only advantages of which were a pleasant taste and a laxative action.

Apart from the rare cases of scurvy no clinical evidence obtained in Britain worth consideration seems to exist which throws any light on the value of fruits in a therapeutic sense, except perhaps the banana, for which much success has been claimed in coeliac disease. On the other hand, on the Continent there is a belief, extending back to the days of Tissot in the 18th century, backed by much recorded experience, that many fruits possess considerable therapeutic properties.

Treatment of Diseases

Heupke of Frankfurt a/M. has published a semi-popular book (1949) on the use of fruit and fruit juices in the treatment of diseases of the blood vessels, heart and kidneys, alimentary system, and of gout. He lays down detailed directions for the preparation of diets containing fruit and fruit juices, and the duration of the treatment. He recommends that the course of treatment should last not more than about a week at any one time, or alternatively, that fruit days (Obsttage) should be given at weekly or longer intervals over seven weeks.

On fruit days 2-3 lb. of fresh fruit are given, or up to 1 litre of juice, providing 600-700 Calories and up to about 10 g. of protein. Fruit days of this sort are really fast days and they obviously could not be kept up long with impunity. To increase the energy content of the diet he adds nuts and dried fruit in suitable amounts.

The distinctive feature of the fruit diet is its high content of potassium relative to sodium. In our ordinary mixed diets the potassium-sodium ratio is of the order of 1 : 2 compared with 6 : 1 for the fresh fruit diet, and 13 : 1 for the fruit juice diet. The fruit diet is, of course, very poor in acidic elements, phosphorus, sulphur, and chlorine.

According to Heupke the change in the potassium-sodium ratio plays an important part in the treatment of renal-circulatory syndromes and in hyperpyesia. The beneficial effect he attributes to the diuretic effect of potassium which causes withdrawal of sodium chloride from the body and in turn diminishes the volume of blood and the amount of water in the tissues. Potassium citrate has been recognised as a diuretic and potassium acetate as a diaphoretic for many years and it seems reasonable to suppose that these salts in fruit juices would act in the same way as they do when given in pure form therapeutically.

Citrus Fruits and Bananas

Richards and others (1927) showed that the addition of potassium citrate to the diet of young pigs diminished absorption and retention of nitrogen, calcium, and phosphorus, and that sodium had the opposite effect. They found no evidence to substantiate the view formerly put forward by Bunge that excess potassium drained sodium and chlorine from the body. On the other hand, Chaney and Blunt (1926) found that additions of citrus fruit to the diet of children increased the retention of calcium, phosphorus, magnesium, and nitrogen, and also the rate of growth.

Eddy (1933) found that bananas also increase the retention of calcium in boys and in rats, and Lanford (1942) showed that potassium citrate and citric acid in

amounts similar to those found in lemon juice stimulated, though to a less extent, retention of calcium.

Several authors have reported success in the treatment of diseases of the heart and blood vessels with fruit or fruit juice. Bock and Lebsanft (1942) compared the effects of fruit juice, salt-free, and ordinary hospital diets on patients with essential hypertension. In 97 patients on the fruit juice diet the systolic blood pressure fell on the average by 67 mm. and the diastolic by 36 mm., compared with 44 and 25 for 105 patients on the salt-free diet, and 34 and 20 mm. respectively for 69 patients who were not treated dietetically.

Gutzeit (1928) found fruit and vegetable juices of great benefit in cases of failing compensation and angina. Hahn (1943) found more improvement in the electrocardiograms in patients treated on fruit juice diets than in those treated on salt-free diets. Dick and Schwarz (1947) showed in dogs that the Kempner rice-fruit diet (250-350 g. rice 750-1,000 cc. fruit juice or fruit and 100 g. sucrose) caused significant decreases in the blood pressure of dogs affected for two years with experimental hypertension.

Fruit and Rice Diet

Blöch (1950) has reviewed recent published work on the Kempner diet in hyperpyesia. Of 71 cases of essential hypertension treated, 67 per cent. were improved and 33 per cent. unchanged; both the systolic and diastolic fell in the former after a very variable period—a few days to several months, and in some cases the heart showed remarkable decreases in size. More recently this mode of treatment has been tested clinically by a committee specially appointed by the M.R.C. (1950).

The diet consists only of rice, fruit (1,500 g.) and sugar with no added salt or fat, and yields some 2,000 Calories and 20 g. of protein daily. It was given to 44 cases of benign, malignant, and renal hypertension. Significant lowering of the blood pressure occurred after a few days but rose again when the diets changed. Sodium seemed to be the most important pressor factor in the diet because when the sodium chloride was increased even on the rice-fruit diet, the blood pressure rose rapidly.

One of the renal cases developed uraemia and died while on the diet; it is therefore not advised for the treatment of renal hypertension. All the patients lost weight; none of them liked the diet and about six weeks was as long as any of them could tolerate it.

Peptic Ulcer

Heupke claims much success in the treatment of peptic ulcers with fruit and fruit juices. He recommends one litre of juice of apple, blackcurrant, strawberry, blackberry, cherry, or grape for about five days, after which the patient is put on an ordinary peptic ulcer diet. Grape juice requires dilution to avoid harmful osmotic effects; it contains some 18 per cent. of sugar.

Tests of the effects of fruit juices on secretion of the gastric juice have given variable results. Of the papers consulted in which the effects of fruit juice on cases of peptic ulceration are recorded, three report increases in acidity, three no change, and two decreases; one that fruit juice delayed the emptying time of the stomach; one that it improved digestion of milk, two that it caused some relief of pain, and one where there was no change in symptoms.

Diarrhoea and other Ailments

Treatment of acute diarrhoea by means of the "apple cure" has, according to Heupke, had very successful results in recent years. This treatment was introduced by Tissot in the 18th century and it was revived in more recent times by von Moro and Heissler. The beneficial effect of the apple purée is attributed mainly to its pectin content and the acid reaction. The pectin swells and engulfs the bacteria causing the diarrhoea and the acid reaction prevents their further growth.

Dried blaeberries given orally have been used as a household remedy for diarrhoea for many years; the fresh berries and the juice are also beneficial, but the dried berries are claimed to be more effective. Chronic diarrhoea did not respond with the same degree of certainty to fruit treatment; the banana was found to be the most effective.

In fevers of short duration a day or two of fasting is often of great benefit; the body is enabled to get rid of waste products and there is little desire for solid food of high energy-yielding type. But there is generally a thirst that is difficult to satisfy and for this fruit juices seem to be the most suitable. By their excess of base they neutralise acid metabolites and by supplying relatively large amounts of mineral salts and vitamins they exert their "protective" influence on the body as a whole.

Many fruit juices are far from negligible also as sources of energy; for instance, two pints of apple juice provide about 600 Calories. The fruit juices are acceptable to most patients.

In fevers of long duration rigid fruit days are contra-indicated, because of the need to maintain the patient in the best state of nutrition possible. Fruit juices, however, still have their place for the relief of thirst, and because of their protective value and acceptability; for such fever patients a variety of fruit juices is desirable.

Reproduced from the Monthly Bulletin of the Ministry of Health and the Public Health Laboratory Service, 10, September, 1951, p. 209, with the permission of the Controller of H.M.S.O. Crown Copyright Reserved.

REFERENCES

Blöch, J., *Wien. Med. Wochschr.*, 1950, **100**, 672.
Bock, H. E., and Lebsanft, E., *Arch. f. Kreislaufforsch.*, 1942, **10**, 210.
Chaney, M. S., and Blunt, K., *J. Biol. Chem.*, 1926, **67**, 829.
Dick, G. F., and Schwarz, W. B., *Proc. Soc. Exp. Biol. Med.*, 1947, **65**, 22.
Eddy, W. H., *Am. J. Pub. Heal.*, 1933, **23**, 129.
Gutzeit, K., *Verh. deutsch. Ges. inn. Med.*, 1928, **40**, 220.
Hahn, W., *Klin. Wochenschr.*, 1943, **22**, 162.
Heupke, W. (1949). Obstkuren und Obstsaftkuren. Umschau Verlag Frankfurt-a-M.
Lanford, C. S., *J. Nutrn.*, 1942, **23**, 293.
Medical Research Council (Special Committee), *Lancet*, 1950, **ii**, 509.
Richards, M. B., Godden, W., and Husband, A. D., *Biochem J.*, 1927, **21**, 971.

Food Packaging

Progress in 1951

John I. Anderton, M.Sc.
The British Food Manufacturing Industries Research Association

The supply position of the majority of packaging materials has become so difficult during the past year that food manufacturers might well be forgiven for thinking of 1951 in terms of retrogression rather than of progress. Many manufacturers have been concerned more with meeting the demand for current lines than with the development of new ones. In spite of the adverse conditions obtaining last year, progress in the science of food packaging has continued to be made, and there must be few manufacturers for whom the advances made during the past year do not hold out some benefit.

NEW and better types of packaging material continue to appear on the market, and albeit they are themselves in short supply, they offer the two-fold advantage of giving more satisfactory protection than the erstwhile conventional materials and of exerting a sparing action on the latter. Notable examples of this class of material are the various types of transparent film and plastics now being produced.

Man power being now one of the most expensive and, in some areas, the scarcest commodity of all, food manufacturers in general are continuing to increase the degree of mechanisation of their processes, and considerable attention has therefore been devoted in this review to new packaging machinery developed during the past year.

Transparent Film

As was evident at the National Packaging Exhibition, held in London early in the year, progress in the development of transparent films in packaging continues unabated. Despite the fact that the resumed introduction of the Board of Trade non-permitted list in June, 1951, has led to the disappearance from the home market of many packs wrapped in the cellulose films, the popularity of transparent-wrapped food with the public, and therefore with the manufacturer, continues to grow.

As the growth of self-service marketing continues in this country, so the demand for food packaging materials will increase, prepackaging being an essential feature of this system of sale. Apart from the self-service system, however, the prepackaging of goods is increasing, and there are today very few processed commodities which are not factory packed in containers for the retail trade. That these closely related trends will in fact continue there can be little doubt, for general conditions at the present time, and the high cost of labour in particular, militate strongly against the practice of hand sorting and weighing goods while the customer waits.[1]

It has now been amply demonstrated, particularly in America, that the sale of foods prepackaged in transparent material, which allows the customers to see what they are buying, is markedly superior to that of similar goods packed in opaque materials. It follows, therefore, that the increased demand for packaging materials imposed by these marketing trends will fall particularly heavily on transparent films.

A novel pack produced by Metal Box for William Evans and Co.

Three Types of Film

Reports from the manufacturers of all three types of transparent film in use in Britain—cellulose film, polythene, and rubber hydrochloride film—fully bear out these observations. There is a growing demand for cellulose films, particularly for the wrapping of small luncheon snacks in convenient and hygienic units for sale in restaurants and canteens, and for the protection and display of products sold in self-service stores.

Cellulose films are still the most popular in this country, for they combine transparency, attractiveness, and good functional performance with a relatively low cost. Very beautiful effects can be obtained, particularly when the printing is done on the reverse side.

The use of polythene film is also growing. Evidence is accumulating that, while being suitable for many other types of food packaging, the particular qualities of polythene film make it especially suitable for the packaging of quick-frozen foods.

Printing on Polythene

Several firms have entered the field as producers of this film, one of which reports the development of two processes for printing on polythene, which are both claimed to give excellent results at reasonable cost. The printing can be carried out only in single colours at the moment, but it is hoped that further developments will follow shortly. This important advance removes what has hitherto been a

deterrent to the full use of polythene as a packaging material. The printing in no way impairs the protective quality of the film.[2]

Polythene film is not so transparent as cellulose and rubber hydrochloride, the other types of film in general use in this country, but this does not offset its excellent functional characteristics. The main disadvantage in its use at the moment is its relatively high cost.

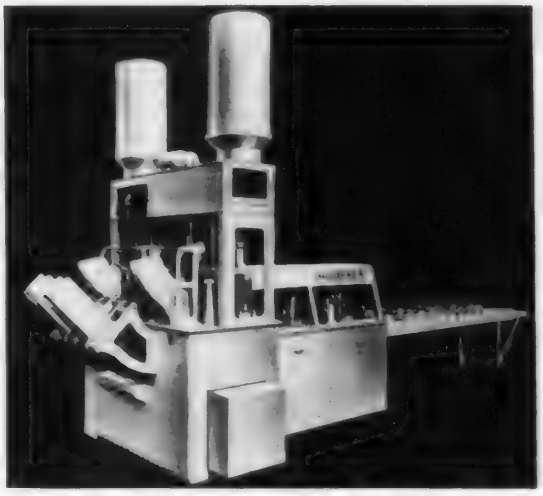
Rubber Hydrochloride Film

Increasing demands for rubber hydrochloride film are also reported. The high transparency and the ease with which it can be printed greatly increase its virtues as a heat-sealable moistureproof film. While being virtually proof against the passage of moisture-vapour and oxygen, it is relatively permeable to carbon dioxide; advantage has been taken of this property in its use for the packaging of coffee, which produces carbon dioxide during storage. A rubber hydrochloride-kraft paper laminate, which protects the coffee from moisture changes but allows the carbon dioxide produced to diffuse out, has been claimed to be the best packaging material yet produced for this commodity.[1]

Another novel use to which rubber hydrochloride film has recently been put in America is the packaging of a ready-to-cook meat meal. Designed to meet an increasing demand for packaged food units suitable for outdoor cooking and eating, the pack consists of a transparent film pouch which attractively displays four skinless frankfurters in a savoury barbecue sauce, and a pat of butter. Printed instructions on the back of this "Picnic-Pak" tell the buyer to submerge the whole unit in boiling water for seven minutes, slit the pouch, and serve. Current sales are stated to indicate a large indoor market.[3]

Uses of Laminates

Another aspect of the use of transparent films is their use as laminates with metallic foil and paper, and with each other. The lamination or coating of metallic foils with plastic materials serves to strengthen the foil, to prevent corrosion by the material packaged, and to increase its moistureproofing powers by blocking up minute pinholes in it. Perhaps most important of all, it allows the foil to be heat-sealed. One of the most suitable materials for this purpose is the rubber hydrochloride film, laminates of this material with metallic foils being widely used for packaging many types of food product.



The magazine feeds for cartons and bags in the Autopack machine.

One of the slight defects of this film is its tendency to deteriorate when exposed to strong light. Protection of the material from such action by an outer covering of metallic foil, however, completely remedies this.

Cellulose Acetate

Cellulose acetate is also a popular laminating material in this country; although it is more permeable to water than rubber hydrochloride film, laminates of acetate and metallic foil provide excellent moisture protection and are used for a wide range of foodstuffs.[4]

Polythene, on the other hand, being itself an expensive commodity, is used rather in conjunction with a cheaper commodity like paper than with another expensive one like metallic foil, and there is no doubt but that polythene coated papers provide the most economical way of using this excellent water-vapour barrier.

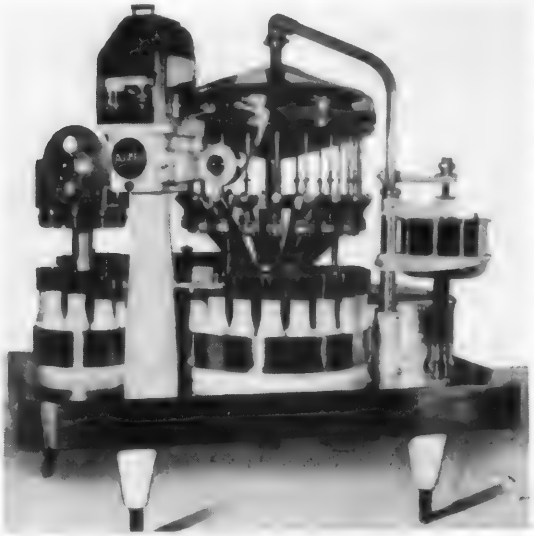
Paper can be obtained with coatings of half a thousandth of an inch thickness, whereas the thinnest film is three times this thickness, and is consequently much more expensive.[1] A service now exists where users can have their own papers coated with polythene, which provides an extremely tough glossy coating with exceptional resistance to the diffusion of moisture.[4] Polythene is also highly resistant to heat and cold, and polythene-kraft paper bags have been used in America for the transport of hot meals, and are excellent for wrapping quick-frozen food.

Flexible Liners for Drums

Another use which is now being increasingly developed for polythene-coated papers is the provision of flexible liners for fibreboard drums. Polythene-coated kraft papers, used for this purpose, withstand a considerable amount of rough handling, and can be heat-sealed to give perfect protection from moisture. By the use of these liners, fibreboard drums can be employed for many purposes for which they would not otherwise be suited, and can be used again and again by the simple process of inserting a new liner. Similar liners are in use with metallic drums, and eliminate the necessity of washing and sterilising the drums before re-use.[4]

Fruit and Vegetable Packaging

Before leaving this subject of the prepackaging of foods in transparent film, the prepackaging of fresh fruits and vegetables is worthy of special mention. Several papers on this subject have appeared in the literature during the past year or so, and there seems little doubt but that the trade is showing increased interest in this method of marketing these particular commodities. A range of window cartons, soft fruit punnets, and over-wrapped apple and



An Albro milk filling and capping machine.

tomato boats, designed for the prepackaging of graded produce in retail units, have been produced. These packages have been shown at several agricultural shows, and are reported to have aroused great interest among growers, wholesalers, and retailers.[5]

There are several obvious advantages to the packaging of fruit and vegetables in this way, not the least of which is the fact that they allow the individual grower or wholesaler to create a demand for his product by branding the pack with a trade mark or brand name. Products packed in this way have been shown consistently to outsell and to fetch higher prices than unpacked produce.

Another transparent film, used for windows and for overwrapping in these cartons, is described as having several outstanding advantages for this type of packaging. Being waterproof but not moisture-vapour-proof, it is reported to be able to breathe freely, thus keeping the produce in garden-fresh condition.[5]

Oxygen Permeability

Several other authors, however, are unanimous in agreeing that no film has yet been found which has a high enough oxygen permeability to allow complete sealing of the product, and that loose wrapping or perforation of the sealed package must be resorted to. This has been reported by Wren,[6] who also gives a long list of suitable cellulose films for various types of produce packed in this way, and has been confirmed by Dock and Bryant,[7] who describe the results of wrapping different vegetables in several types of transparent film. These tests showed that the film used must be moistureproof, to prevent dehydration of the product, but that no moistureproof film investigated had sufficient permeability to oxygen to render perforating or loose wrapping unnecessary. Essentially the same findings are reported by Schomer,[8] who describes a series of similar experiments conducted in America.

Comparative Weight Losses

Schomer also quotes some interesting figures for the comparative weight losses of packaged and unpackaged vegetables. After storage for 11 days in a mechanically cooled refrigerator, followed by 96 hours at 70° C., it was found that vegetables showed the following average losses of weight: unpackaged—13·7 per cent.; packaged in cellulose acetate film—6·5 per cent.; packaged in regenerated viscose film of intermediate permeability—3·7 per cent.; packaged in rubber hydrochloride and polythene film—0·8 per cent. While the severity of this treatment is more in keeping with American areas of distribution than with the much smaller British ones, the figures serve to emphasise the importance of considering the possible saving in weight loss when estimating the cost of prepackaging.

Another way in which plastic film has recently been used in vegetable packing is that adopted by an American company.[9] This firm packs fresh vegetables in regenerated viscose film bags, with one polythene or rubber hydrochloride film bag containing crushed ice in the centre of each carton of 6 or 12 vegetable units. The packed cartons are pre-cooled for 12 to 15 hours, and the ice lasts 20 to 24 hours in normal weather, ensuring fresher produce and less spoilage.

Wrapping and Sealing Machinery

With the increasing use of these various transparent films, a demand has been created for suitable wrapping and sealing machinery. Several machines of this kind have been produced, one of which provides a fully automatic method of feeding, filling, and sealing film bags, and is excellent for packing confectionery and foodstuffs in general.[10] This machine, which is adaptable for use with paper, parchment, or other types of bag which have been rendered heat-sealable, will fill and seal 17 to 40 bags per minute, according to the number of feeders used and the type of material handled. Almost any type of weight, volume, or count filling mechanism may be used with the machine.

Manually Operated Machines

Several smaller and much simpler machines designed for use with heat-sealing films have also recently appeared on the market, one of which is designed for use with heat-sealable bags. It is a manually operated machine of extreme simplicity and low cost, and is especially suited for on-the-spot sealing in retail stores. The basic principle on which the machine works involves the use of a special tape, which is mechanically inserted between the heat-sealing jaws and the material used. This novel idea completely eliminates the troublesome tendency of the material sealed to stick to the heating jaws, and the time factor in the operation is therefore rendered much less critical.[11]

Many other filling, sealing, wrapping, weighing, and counting machines have appeared in the past year, and the ones briefly described below have been chosen only as examples of the new machines available.

Carton Wrapping

One machine recently produced is for carton wrapping. This can be adapted to handle heat-sealable

wrapping material or material requiring to be gummed, and the two models produced handle a wide range of carton sizes at speeds of up to 80 per minute. A photoelectric registration unit can be fitted to this machine, if desired; this permits the use of printed wrapping material in the economical roll form and locates the printing accurately on the carton.

Confectionery Wrapping

Designed for weighing wrapped and unwrapped confectionery and similar uneven articles, an automatic weighing machine is described as weighing to an accuracy of one sweet plus. This does not mean that every weighing is one full sweet in excess, but that the removal of one sweet from the weighed lot will render it "light." The machine will operate at a speed of 12 to 20 weighings per minute, according to the kind of confectionery being weighed, and is powered by a self-contained ½ h.p. geared motor; it forms a valuable addition to the range of automatic weighing machines available.

One recent addition to the range of packaging machines is an automatic cartoning and bag inserting machine. This fills accurately weighed or measured quantities of powdered or granular material into paper liners, inserts these into cartons (erected, folded, and sealed by the machine itself), and adhesively seals the cartons. The machine is described[12] as incorporating a number of highly original features, one of which is the overhead system of manipulation adopted for the bag-sealing and carton-closing processes, which allows the actuating mechanism and operating arms to be kept well clear of the product itself. The machine is of duplex design, with twin filling and sealing lines, giving an output of 80 filled and sealed cartons per minute.

Packaging of Dairy Products

Considerable interest has been centred during the past year on the production of machinery for the dairy industry. An excellent new butter moulding and wrapping machine, with a rate of production of up to 110 packets per minute, has been produced,[13] and several new milk filling plants have also appeared on the market. One bottle filling and capping machine, built in three models, has capacities ranging from 6,000 to 9,000 pints per hour, quart bottles being filled at somewhat lower rates. The machine is available either with an integral cap-making press and closing heads for aluminium caps, or with heads for putting on cardboard discs.[14] Another newly developed milk bottling unit comprises a foil capping machine, which has been built into a vacuum-operated milk bottling machine, making a complete filling and capping unit. This machine is built in two models, having an output respectively of 6,000 and 8,000 pint bottles per hour.

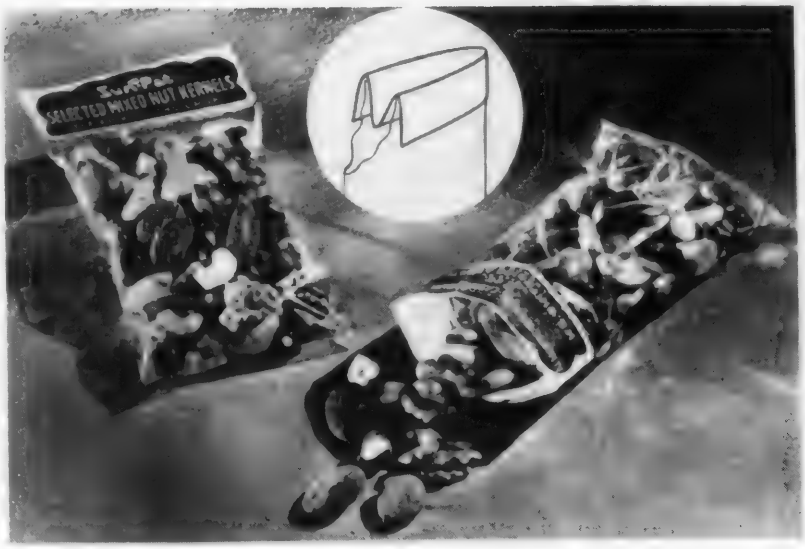
Other milk bottling units are produced in sizes ranging from a small machine with a capacity of 1,000 bottles per hour to a large duplex-head model with a capacity of 24,000 bottles per hour.[15]

Cartons for Milk

Plant is now available for the printing, forming, sterilisation, filling, and sealing of milk cartons, at the rate of 3,600 per hour.[16]

Perhaps the most revolutionary development in the field of milk packaging during 1951, however, is one announced from Sweden. It is a new packaging machine, particularly applicable to milk, which departs very strikingly from the orthodox.[17]

It is probable that such an unusual pack, if adopted in this country, would meet with a considerable consumer resistance. Milk, however, is a necessity rather than a selectively bought commodity, and if the larger dairies were to decide that the advantages of the Swedish pack warranted its adoption, the consumer's milk requirements ought rapidly to outweigh any resistance to it. This would be particularly so if any of the saving effected could be passed to the consumer.



A new cellulose film pack for nuts. *Photo British Cellophane.*

Photoelectric Appliances

In conclusion, mention must be made of one or two recent applications to packaging of highly technical apparatus developed in other industries. Photoelectric appliances are being used to a great extent as counting devices, and one such "electric-eye" device is employed in an American brewery to control the delivery of cases to the despatch bays. The exact number of cases required to fill an order is dialled on a control panel, the conveyor system is set in operation, and the machine then takes over and controls the delivery of cases at the loading bay, automatically stopping the conveyor system when the exact

number of cases dialled has been delivered.[18]

A photoelectric appliance, described as "a simple, low-cost, streamlined unit which mounts above any container line, and is designed to pick up and signal variations in package sealing at a speed as high as 1,000 per minute" has been developed in America. It can be used for beer, wine, and fruit concentrate lines, and also works well with tomato ketchup.[19]

In this country, an electronic bottle counter is now available which can be incorporated into existing bottling systems with little or no modification. This counter has proved itself very reliable in use.

An electronic metal detector, again capable of being fitted to existing lines, will detect either ferrous or non-ferrous metal contaminants, and can be adapted to give any one of a variety of warning responses.[20]

Developments in the Industry

An even newer device, still only in its experimental stages, is announced from America. This appliance, which depends for its functioning on a crystal highly sensitive to variations in X-rays, promises to make possible for the first time the high-speed, automatic X-ray inspection of canned and packaged foods. It is thought to be applicable to the checking of the product level and the detection of foreign bodies in sealed containers of all types. Pilot laboratory models have been built to inspect the product level in baby food, beer, soup, and other canned goods. A very high speed of operation is attainable.[21]

Another interesting project, as yet only in the experimental stages, is the development of a system of electromagnetic transportation of cans. Electromagnetic pulses are used to provide a continuously moving field, which will transport cans smoothly without the danger of marking lithographed surfaces. Each can, running on its rim and rotating as it progresses, is carried round a stationary vertical track at the peak of a wave of magnetic force, so that individual cans are automatically separated by a distance equal to the wave length and cannot touch their neighbours.[22]

It will be seen from these brief descriptions of recent appliances that whatever the immediate setbacks received, progress continues to be made in the science of food packaging. Whether this progress can be applied successfully in Britain depends to a large extent on the supply position of the raw materials of packaging. It depends also, however, upon food manufacturers themselves, and upon their ability to assess accurately the reaction of their consumers to possible changes in packaging methods, and to correlate the true losses and gains involved in such changes.

REFERENCES

1 A. L. Gould. *J. Inst. Packgng.*, 1950, **1**, 10, 11.
2 Anon. *Packaging*, 1951, **33**, 256, 45.
3 Anon. *Packaging Parade*, 1951, **19**, 222, 99; *Food Engineering*, 1951, **23**, 7, 126.
4 J. A. Buck. *Tin-Printer and Box Maker*, 1951, **27**, 316, 26.
5 Anon. *Brit. Pack.*, 1951, **13**, 6, 36
6 F. A. Wren. *J. Inst. Packgng.*, 1951, **2**, 13, 179.
7 E. H. Dock and P. M. Bryant. *Fruit Tr. J.*, June 9, 1951, p. 16.
8 H. A. Schomer. *Pre-Pack-Age*, 1951, **4**, 10, 13.
9 Anon. *Ice and Refrig.*, 1949, **117**, 2, 24; *Food Sci. Abs.*, 1951, **23**, 4, 383.
10 Anon. *Paper Box Bag Mkr.*, 1951, **55**, 106.
11 Anon. *Packaging*, 1951, **33**, 248, 98.
12 Anon. *Ibid.*, 1951, **33**, 247, 46.
13 Anon. *Ibid.*, 1951, **33**, 247, 40.
14 Anon. *Food*, 1951, **20**, 234, 117.
15 Anon. *Packaging*, 1951, **33**, 251, 66.
16 Anon. *Ibid.*, 1951, **33**, 251, 75.
17 Anon. *Food Manufacture*, 1951, **26**, 12, 501.
18 Anon. *Packaging Parade*, 1950, **18**, 213, 78.
19 Anon. *Food Engng.*, 1952, **24**, 1, 82.
20 Anon. *Brit. Pack.*, 1951, **13**, 6, 35.
21 Anon. *Canner*, 1951, **112**, 8, 16.
22 Anon. *Packaging*, 1950, **32**, 245, 42.

The Fat-hardening Industry

A REVIEW of the development of the fat-hardening industry in the light of the most important researches is contained in a recently published book.* The author has concentrated mostly on the work of his own Dutch school and, while this is justified by the declared purpose of his book, it has not resulted in a properly balanced account of the subject. Nevertheless, it is an addition to the literature that will be valuable and instructive to scientists in the oils and fats industry.

The first half of the book describes in theory and practice the operations that are preliminary or ancillary to the process of hydrogenation. In this section the account of the pressing and extraction of the raw materials is particularly good, especially the latter, about which comparatively little has been published, although the process is becoming more common in the industry.

It would be a service to the industry if the author extended his description of the technical preparation of hydrogen to bring it up to the same high standard, although it is realised that this subject is probably not so directly allied to his own researches as is the preparation of catalysts.

Technically, deodorisation is a very interesting part of the treatment of hydrogenated oils and, although Prof. Waterman's description of it is adequate, this section of the book might also be extended with advantage.

It is right that in this book the operations leading up to hydrogenation should be dealt with in some detail.

The second part of the book deals with various aspects of the theory of hydrogenation — the thermodynamics of the process, the effect of catalysts, the temperature distribution throughout the reaction mass, and selective hydrogenation. Also, there is a brief consideration of such side reactions as isomerisation, polymerisation, interesterification, and migration of the double bond.

There are also sections on plant and equipment, economic aspects, high-pressure hydrogenation of alcohols, and possible future developments such as conjugated hydrogenation and reactions with atomic hydrogen.

The book has been translated from the Dutch, but there are few passages where the style betrays this fact.

* *Hydrogenation of Fatty Oils.* By H. I. Waterman. Pp. 254, including index, illustrated. Elsevier. Price 42s. net.

World Progress in Fish Canning

PART II

Mogens Jul

Chief Technologist, Fisheries Division, FAO.

The final part of this article discusses the canning of sardines, sprats, and herring, how certain of the canning processes are being mechanised, the development of new products, the work of the research institutes, and the problems which lie before the industry.

THE canning of sardines and herring-like fishes follows similar processes and the equipment used is of more or less identical design (Huntley, 1951).

One of the principal problems is presented by heading and gutting the fish. Several types of machine were in common use for this purpose in the California pilchard canning industry even before 1938. A machine of Californian design, using a vacuum suction principle for the removal of the viscera, has been used successfully also in the South African pilchard canning industry.

The machines from the United States, however, have not found acceptance in places where sardines, sprats, or small herrings constitute the major part of the canning pack; these species seem to be more delicate and more difficult to handle in machines than pilchards.

The Norwegian sprat industry has been in the fortunate position that it can generally free the fishes completely from feed before they are removed from the water by impounding the catch, thus making evisceration unnecessary. In other countries, canners of sprats, sardines, and herrings have had to rely on evisceration by hand.

Gutting Machinery

Recently, however, improved machines have been produced by the Arenco Company in Sweden, the Nordischer Maschinenbau in Germany (Wille, 1949), and the Fisheries Research Board of Canada (Harrison and Roach, 1950). The latter has designed and patented an anchovy gibbing machine.

Machine heading and eviscerating is now carried out extensively in the herring processing industries. Such machinery is used not only for canning, but also for products such as salted herring and herring or anchovy *delicatessen*. These products are not heat processed and make, therefore, even higher demand on the complete removal of all bones from the fish as the bones are otherwise softened up by the heat processing.

Special machines which bone the fish and prepare them as fillets have been used by these industries.

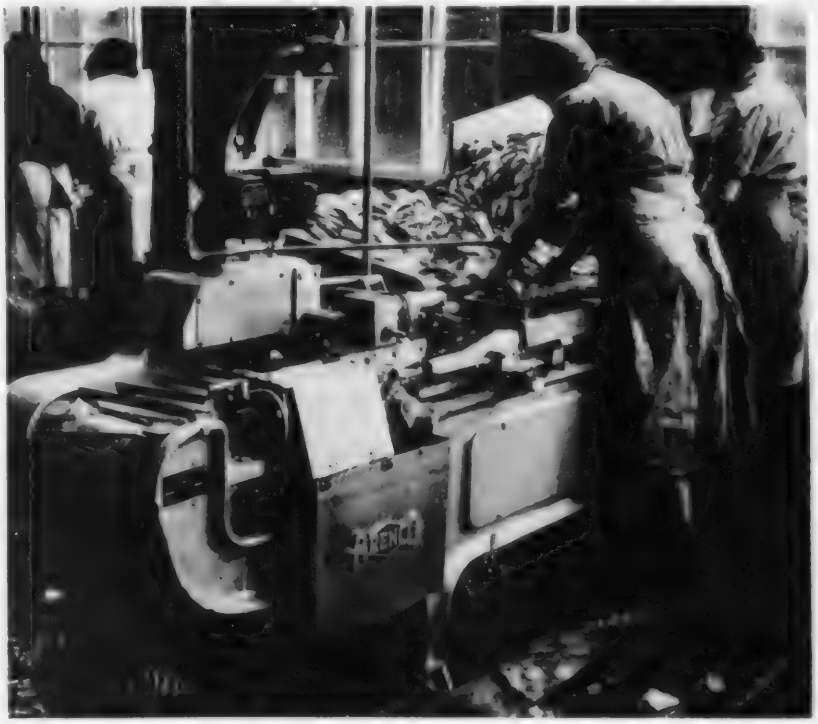
Another machine which will cut the herring fillets out into small pieces, which are normally used for herring tidbits, has been employed. These machines found general use in the last decade in the herring industries, but have proved difficult in the handling of sardines, sprats, or small herrings. In France and Portugal, sardines have generally been headed and eviscerated by hand.

A great deal of work has been put into the arrangement of efficient cleaning tables equipped with mechanical conveyors, often adaptations of the Spanish Masso design.

One of the modern French sardine lines, the Toquer line, uses a heading and gutting system which operates on the fish when it is hung by its tail on the racks in a conveyor system.

Experimentation on the design of eviscerating equipment which would work satisfactorily on sardines has been continued. The latest reports from France (Durocher and Roskis, 1951) indicate that workers there recently experimented with equipment which will carry out the process satisfactorily. It consists of a special roller grader which grades the fish into sizes; this seems necessary for effective evisceration.

Other machines carry out the



Feeding the Arenco nobbing and gutting machine. *Photo C.W.S., Lowestoft.*

Feeding fish into a Fisadco washing and descaling machine. *Photo C.W.S., Lowestoft.*

orientation of the fish and the feeding of them into the heading machine, an operation which otherwise is quite labour consuming. The line is said to be designed for a capacity of 100 to 120 fish per minute.

Washing and Brining

Other processes which have been in need of mechanisation are the washing, dry salting, so-called rousing, or brining of eviscerated fish. A machine has recently been introduced in France which will wash the sardines placed on the usual frying grills under water jets. It proved to be more difficult to find a satisfactory arrangement for continuous salting or brining.

A Norwegian machine, which resembles a vegetable blancher, has been put into use for the brining of sprats. It consists of a perforated cylinder with internal baffle plates, arranged in a spiral on the inside surface. When the cylinder rotates, partly submerged in brine, these plates move the fish forward. At the end, they lift them out of the brine and place them on a conveyor belt. The standard models are based on a brining time of eight minutes.

Reducing the Moisture Content

In the canning of sardines, sprats, and herring-like fish it is necessary to remove a certain amount of moisture from the fish before the can is closed. In the sprat canning industry of the Scandinavian countries, this is generally carried out in combined smoking and drying ovens (Vesterhus, 1950). A special smoking tunnel, designed by the Kyaerner Company of Norway, has found quite general acceptance in Scandinavia and other countries.

In Denmark, a simple smoking tunnel designed by a fish canner is being used at several plants. It uses drying and smoking in counter-current air with an initial temperature of the air of 140°C. (244°F.) and an end temperature of 80°C. (176°F.). Direct fuel gases are used and 80 per cent. of the air is recirculated.

Previously, the fish were carried through the oven placed on wire mesh trays on a conveyor system. As these marked the fish, they have now been replaced by perforated steel plates. Each perforation has a wide slit in one side and a narrow slit in the other. The tail or the head of the fish is introduced through the holes and attached in either the large or the narrow slit according to its size. After drying, the heads or tails are cut off by moving a large knife across the plate, this providing an easy method of releasing the fish.

In some countries, experiments have been carried out with electrostatic smoking. Extensive tests were published by the Fish and Wildlife Service of the United States Department of the Interior (Hamen and Kust, 1948). The fish were placed in the open cans which went through the smoking chamber on a metal conveyor belt. The smoke was produced by an ordinary smoke generator and chilled with a water spray for condensation of undesirable fractions. It was then lead into the chamber over a grill which formed the positive electrode and was charged with about 20,000 volts. The cans and the conveyor belt, which was earthed, formed the negative electrode.

Reports from tests of the product, both from the United States and elsewhere, indicate that its flavour was satisfactory, but it had not acquired the golden colour normal for a smoked product.

The process never gained commercial acceptance in the United States; it is, however, not unlikely that electrostatic smoking has possibilities especially as an aid to the process as carried out in the Scandinavian canning industry where the fish are smoked while hung or laid individually on racks. This gives the possibility of a better contact with the smoke and thereby a better colour.

Recently, a German company announced an electrostatic smoking apparatus which appears to be very similar to that tested in the United States. No information with regard to its performance has yet been received.

Removal of Moisture by Frying

In the canning of sardines in France, Spain, Portugal, and Morocco, it was generally customary to remove the moisture from the fish by frying. In the orthodox process, it was carried out by putting the fish, tails up, in grills which were placed in hot oil or taken through a hot oil bath on conveyor belts. The oil was sometimes replaced by a salt water brine with much the same result. These processes are, however, rather cumbersome and expensive, and have been replaced by methods by which the fish is cooked in steam.

After cooking according to any of these methods, the fish has to be drained and dried. This process is at present generally carried out in air drying tunnels with

forced air circulation (Boury, 1950). Where it is carried out in the open air, special regulations are generally enforced to prevent any contamination of the fish during drying.

Dry Air Cooking Systems

As steam processes are difficult to adapt for continuous operation, developments in both France and Portugal have been in the direction of cooking fish in dry air. This is a comparatively difficult procedure as excessive drying of the surface of the fish often results. However, several satisfactory processes have recently been designed, and one which is particularly successful is the Toquer process. An advantage of dry air cooking systems is that the drying period which follows oil frying or steam cooking in the more traditional process can be dispensed with.

It appears that the difficulty of excessive surface drying in dry air cooking systems can be partly overcome by cooking in infra-red light which gives a very effective penetration of the heat. The rate of penetration can more or less be adjusted by the choice of wavelength. Several cooking tunnels of this type are in operation in France (Boury, 1950). The infra-red light emanates either from electric bulbs or from gas heated steel tubes. The fish are generally conveyed through the tunnels on wire mesh trays.

One type of equipment which has been of considerable interest to the sardine canning industry is a packing machine which wraps individual cans in waxed paper. Such machines have long been available, but an inexpensive one has recently been introduced by the Lubecawerke of Germany.

The Toquer System

In the Toquer system, the fish which previously have been brined, are clipped on to a rack on a conveyor belt. This belt carries the rows of fish past a special beheading and eviscerating organ, after which they are washed under a water jet spray. The conveyor then carries them through a hot air tunnel, for combined pre-drying, cooking, and final drying.

Brining the herrings. *Photo C.W.S., Lowestoft.*

Where the fish leaves the tunnel, special knives trim the necks and cut the fish off in the proper lengths. They are then carried by conveyor to the hand packing tables. This very interesting type of equipment is reported to have worked successfully for several seasons, and is in use in two French plants.

Mechanising the Processes

Another system is to pack the herring raw brined or unbrined in the cans and carry out the total process of drying, cooking, etc., while the fish is in the can. This is a great simplification as far as mechanical operations are concerned.

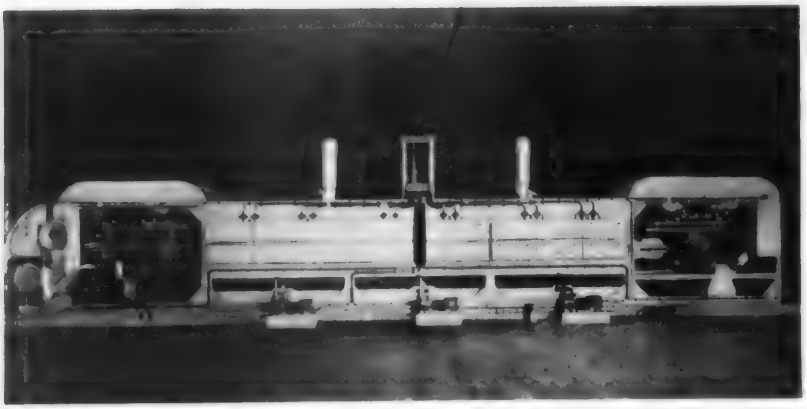
Processes of this type have for many years been in use in the California pilchard industry. They were, however, extremely difficult to adapt for the canning of sardines where very high demands are made on quality and appearance (Boury, 1950).

It is difficult to prevent the fish from sticking to the sides of the can or one fish from sticking to the other when there has been direct contact during cooking and drying. This problem seems to be particularly important in the canning of sprats and herring because they are usually completely freed from scales. The scales, which remain on sardines, do to some extent prevent the fish from sticking to the can.

Another difficulty is that of getting the fish uniformly cooked and dried when they are not hung individually or spread out in layers or rows on flakes or grills as in the traditional frying, cooking, or smoking processes.

A third difficulty is that sardines and sprats, contrary to normal usage in the California pilchard industry, are mostly packed in oil. This requires that the product be sufficiently freed from moisture to prevent any separation of water during heat processing. This is difficult to accomplish in any process where the fish is cooked while in the can.

In one process of this type, developed in Britain by Mather and



The Hartmann process of fish canning uses infra-red radiation. *Photo Lubecawerke.*

Platt, the fish are beheaded, eviscerated, and brined according to traditional methods. They are hand-packed on modern conveyor-type packing tables in cans which previously have been given an oil coating on the inner surface by the use of a spray gun to prevent sticking.

The packed cans pass on a conveyor belt through a hot air predrying tunnel which secures firmness of the skin and afterwards on another conveyor into a similar tunnel where cooking is carried out by steam. The cans are then placed by hand on trays which are covered with a wire mesh grill and put in a centrifuge rotating at 450 r.p.m. They then pass into a second hot air tunnel which gives the fish its fried taste and removes any surface water which has not been removed in the centrifuge. From there, the cans go to traditional oil fillers, exhausters (where required), and closing machines. The capacity of this equipment as normally designed is 50 quarter club cans per minute. Several machines of this type are in successful operation.

One advantage of this system is its flexibility in that pre-drying, cooking, drying, etc., can be varied independently within wide limits.

A Belgian Plant

An even more radical design has been developed by the International Machinery Corporation of Belgium (Cheftel, 1950; Roskis, 1950; Sanders, 1950). The beheaded and eviscerated sardines are packed immediately after washing in cans which have been sprayed with oil. The cans are then placed, generally in rows of eleven, on racks which are covered with a wire mesh grill and attached to the conveyor chains in the machine.

A preliminary brine is added, and the cans are inverted to remove blood and undesirable parts. When there are difficulties with the fish sticking together, the manufacturers recommend adding a small amount of acetic acid to the preliminary brine.

New brine is now added and the cans are carried through a steam chamber where cooking is performed. The cans are again inverted and dried or cooked first in the inverted position and later in the normal position in air. The cans are inverted once more to remove all liquid freed by the drying and the contents are dried again in the inverted position. This cooking and drying of fish while the cans are being inverted several times serves to prevent the fish from sticking to the can sides and to accomplish a more uniform drying.

Oil or tomato sauce is added to the cans while they are still attached to the racks. The cans are then taken through an exhaust box, equipped with a jacketed ceiling which prevents drops of condensing water from falling on them. In some cases the exhaust box is left out. Instead, hot oil or tomato sauce is added to the cans. Where the cans leave the apparatus, steam jets clean the outside of the cans for fat. The racks are automatically removed from the conveyor belt and the cans are released and sent directly to the closing machine.

The machinery is made in three sizes, for 25, 50, or 200 quarter club cans per minute, and is already in extensive use.

Developments in Germany

A type of equipment which should be mentioned is the German Hartmann process by which the gutted, washed, and brined fish placed in open cans on hanging trays are brought by a conveyor system through a long cooking tunnel. The cans pass under infra red electric bulbs. The tunnel has two such cooking sections above one another. Coming out of the last of them, the cans are inverted for draining. During this they are covered by a plate with drains in it. They then go through a drying section which forms the third deck of the equipment.

New Sardine Plant

The development of a fourth machine of this type has recently been reported from Morocco (Meesemacker, 1951). It is designed by Daniel Bonnefont, of Agadir. It is understood that the equipment dries the sardine packed in cans in a hot air tunnel where, for part of the time, the cans are inverted before reverting to the normal position. The air is introduced into the tunnel and recirculated by high speed fans. The capacity of the machine, which is operated by two workers, is 25 quarter club cans per minute. The introduction of this machine is of such recent date that no report is available as to its performance. It is understood, however, that it is a quite inexpensive type of equipment, especially useful for smaller canneries.

Canning Larger Fish

Comparatively little development has taken place with regard to processing equipment for larger fish. However, in the production of canned tunny in France (Boury, 1950), the Toquer system has been used very successfully. The fish, which is cut out in steak-like pieces, is placed in a ring shaped mould, which is carried on a conveyor through the

cooking and drying tunnel. The fish are then transferred from the mould directly into the cans. However, many canners claim that any such process where the tunny is cooked in steam or dry air gives less satisfactory results than cooking in brine where spices may be added.

A filling machine has been produced for tunny which has been cooked in the traditional manner (Boury, 1950). The cooked fish is placed on a rather long cylindrical mould which opens up sideways. The cylinder is then closed, and a plunger presses the fish forward until the slices, which fit right into a can, can be cut off. A similar machine has been developed and put into use in the United States.

Special steaming machines have been designed in Denmark for use with mackerel. One type is equipped with steam jackets, the fish being placed in a chamber with a layer of water on the bottom. Another uses a bell like chamber which is lowered over the rack with the mackerel and closed airtight with water.

Another development in the processing of products from larger fish has taken place in Sweden where automatic fillers are used for packing cod roe paste in tubes. This product is not heat-processed.

Canning Crustaceans

Some progress has been made in canning crustaceans. In the United States, several automatic deveiners and graders have been introduced for shrimps. A shrimp grader has also been developed in Australia.

The introduction in the United States of shrimp peeling machines may be important. The principle used in these machines is one of passing the shrimp over a layer of thin rollers. The shrimp is pressed against the rollers by rubber or leather fingers or springs. Sooner or later during the passage, a corner of the shell is caught by the rollers and torn off while the flesh passes over the rollers without being drawn into them.

An important improvement in the canning of crawfish was introduced in the Union of South Africa (Dreosti, 1949) where research proved that the non-enzymatic browning of the canned product is generally due to reducing sugars. These can be reduced by soaking the crawfish in sea water for up to 15 minutes prior to canning. Soaking exceeding this period should be avoided as it may lead to loss of flavour.

New Fish Products

It can hardly be said that any new canned fishery product has been produced during the last 12 years. Nevertheless, existing canneries have experimented with a large number of new products, some of which may become very important commercially.

One of the most important developments is the canning of boneless, or boneless and skinless, sardines in Portugal. This product found a ready market in the United States.

Much importance is also attached to the development of a boneless and skinless salmon pack which was produced recently in Canada (Berglund, 1950); it is said to receive very good response from the consumers. Salmon canners have also experimented with the introduction of salmon croquettes and other speciality products.

United States canneries have put on the market a lemon flavoured tunny and tunny packed in jelly; one company has put up an entirely new canning line for strained tunny for use as a baby food.

Baby food is also being prepared in the United States from salted cod fish. The same company has put on the market canned codfish which has already been soaked and is ready for use. This product is designed to replace the ordinary dried salted codfish which seems to be losing its popularity in the United States.

The California pilchard canners have experimented with pilchards packed in a special ginger sauce, with flavouring the pilchard with liquid smoke, and with dry packed pilchard in round cans, a so-called tenderloin pack.

The canning of squid has been increasing in the United States and in Scandinavia. In Monterey, a port which is known mainly for its very large landings of pilchard, the total value of the landing of squid exceeded that of the landings of pilchard for the year 1946.

In the Union of South Africa, canned green abalone is being produced (Dreosti, 1950). It was found that a preliminary salting of the abalone for 24 hours with subsequent soaking removed much of the usual toughness of the meat.

A similar salting process was found beneficial in the canning of *Arripia trutta*, the so-called Australian salmon (Neston, 1951). It was found that the colour of this pack, which often is brownish, can be considerably improved by the addition of nitrite.

In the United Kingdom, a new product was developed recently when the canning of pilchard was taken up in Devonshire and Cornwall.

A new Norwegian process seeks to improve the flavour of canned herring by adjusting the *p*H of the product to about 6 and adding a reducing agent, for instance, ascorbic acid. Experiments have been carried out in many countries, with monosodium glutamate which is used in some canned products to improve the flavour. The product was found to have no affect except in the case of fish balls and shrimps where a slight improvement was noted.

In Germany, the canning of herring fillets has been increased substantially and many new sauces have come into use. It is said that sauces which are completely stable during heat processing have been produced.

Polymerised Herring Oil

A special development, which was of the greatest importance, was the introduction in Norway during World War II of polymerised herring oil, the so-called sild oil. During the war years, when no vegetable oils were available in Norway, this product was of the utmost importance for the canners. When well prepared, it is completely odourless and tasteless; nutrition experts seem to agree that its addition is not objectionable from a health point of view. It is inexpensive and after a brief recess due to a certain re-

action to war-developed substitutes, it is now being used quite extensively. It is said that certain markets prefer this oil to the usual vegetable oils.

Sanitation and Hygiene

As operations often had to be carried out in rather small plants, far removed from the main population centres, the fish canning industry was probably somewhat slow in realising the need for a high degree of hygiene and sanitation. However, the last decade has seen great improvements in this direction. Fish canning plants are now mostly modern and well designed with all the necessary sanitary precautions. Wide use is made of the newly developed synthetic cleansing and wetting agents. Chlorination of water supply and cleaning water is often used, together with a special chlorination arrangement for can cooling water.

Canners' raw material is usually received in returnable wooden boxes. These are difficult to clean and have recently to some extent been replaced by aluminium boxes or special kits; where wooden boxes are used, they may be disinfected before being returned to the supplier.

In some sardine canning industries—in Portugal for instance—non-metallic grills have been replaced entirely by iron trays which are tinned yearly, special precautions being taken to prevent any addition of lead to the tin solution. Special washing machines have been introduced for the cleaning of these trays between each use. These and other measures taken in Portugal (Barreira, 1951) have resulted in the elimination of traces of lead from the product.

Inspection Services

The inspection services maintained by various countries to improve the quality of canned fishery products have been considerably improved. A new fish inspection laboratory has been established in Canada, where thorough examination of the canned products is carried out. Recipes giving recommended practices for the canning of various products are also issued by the laboratory.

Much of the improvement of the Portuguese canning industry has been carried out with the assistance of the inspection service of the laboratory of the Portuguese Institute of Canned Fish.

Grading for Export

Tunisia has established export grading for all canned fishery products and the Union of South Africa has formulated detailed standards for such products. These standards are not compulsory, but most canners find it to their advantage to comply with them. Both Denmark and Sweden have newly established extensive laboratory control and inspection systems for exported products.

Research Institutes

The industry has largely been aided by existing research institutes, most of which have been considerably enlarged, and by the establishment of new ones. A few years ago the Food Preservation Institution of Sweden was founded; this serves the whole Swedish food industry and devotes a large amount of work to the canning of fishery products.

Research work in this field has also been initiated in the United Kingdom by an experimental plant put up in Aberdeen by the Ministry of Food and at the Herring Industry Board's experimental herring canning plant in Port Glasgow.

The Fishing Industry Research Institute, established after World War II in the Union of South Africa, has contributed considerably to the country's remarkable development of the fish canning industry.

A new fish canning research institute has been established in Vigo, Spain. The canning industry is also aided by the increased biological research activities into such matters as the availability of raw material and the finding of new fishery resources. Most notable in this respect is the very large Pacific Oceanographic Fisheries Investigation programme of the United States which is aimed at finding new fishery resources and determination of the best fishing methods and grounds in the Pacific Ocean.

Problems Ahead

Some radical new processes which may influence methods of canning fishery products very substantially are at the moment being investigated.

The use of X-rays, supersonic waves, and cathode rays have always fascinated the food preservation industry. If such a method could be found which would eliminate the need for heat processing, great progress would be possible in the field of food preservation.

Interesting results have recently been obtained with the use of cathode rays. Short periods of radiation of fish in layers up to 2 in. can render the fish flesh completely sterile. It has, however, no harmful effect on the enzymes which means that the fish are still subject to enzymatic deterioration (Heen, 1950). So far, no ways have been found to overcome this difficulty.

Many fishery products are quite easily damaged by excessive or even normal heat processing. Experiments have recently been carried out in the United States with the addition of antibiotics to the canned products to reduce the required heat processing. The treatment has not yet been found feasible for commercial operation, but the method may, if developed, bring about great improvements. Other countries have experimented with the addition of other chemicals; extensive preliminary tests have been very promising, but detailed information will not be released until further control experiments have been concluded.

Most of the information used has been based on special papers describing the progress of the canning industries in various countries. These papers were prepared for the Second International Congress of Canned Foods held in Paris in 1951 by Algeria, Australia, Belgium, Denmark, France, Israel, Morocco, Portugal, Sweden, Tunisia, Union of South Africa, United Kingdom, and the United States. Further information was collected from scientific and trade publications and from many personal communications received by the author.

Wheats for Biscuit Flours

P. Halton, M.Sc.(Lond.), Ph.D.(Cantab.), F.R.I.C.
Research Association of British Flour-Millers, Cereals Research Station, St. Albans.

British biscuit manufacturers have built up a world-wide reputation for producing goods of high quality. While this reflects the skill of the biscuit maker such a reputation has also been ascribed to the suitability of home-grown wheats for the manufacture of the types of flour required. Up to a point this may be true but all British wheats are not equally suitable and in consequence the miller at times has difficulty in completely satisfying the requirements of his customers. This article discusses methods of wheat selection for the special purpose.

IF a miller is to supply flour which fits the needs of the biscuit maker he must know the type of flour required and whether a supply of wheats is obtainable which will give such a flour.

Little information on biscuit flours is generally available and while some biscuit manufacturers will have studied the problem and have some knowledge concerning the types of flour which suit their requirements, little of this information has been passed back to the miller who often has had no more to work on than the bare fact that a given consignment of flour has or has not produced satisfactory biscuits. Without a proper specification of requirements the manufacture of any article is bound to give variable results to the user.

Given a specification of flour requirements the miller will still be faced with the problem of obtaining suitable wheats to mill. The farmer grows wheat for the economic return it gives him and, unless he can obtain a premium on wheats which particularly suit the miller for the production of biscuit flour, he will choose the varieties he grows by reason of their agronomic qualities and in particular for the yield they give. For this reason farmers turn to new varieties which promise a better return. This adds to the miller's difficulties since he may not be able to obtain those varieties which experience has shown to produce good biscuit flour since they are no longer grown or are grown only in smaller amounts.

Biscuit Dough Characteristics

In biscuit manufacture, flour, water, fat, sugar, and other ingredients are mixed together, the degree of mixing varying with the type of biscuits being made. After a rest period the dough is passed through rollers to form a sheet from which the biscuits are stamped out before passing to the oven for baking. During these various processes the dough is subjected to stresses and strains. It might be expected therefore that the rheological properties of the dough would be a factor in determining the quality of the finished article. That this is so is shown by the data given in Table 1.

The figures for dough spring or elasticity and dough extensibility were obtained by stretching unyeasted doughs on an extensometer which records on a chart the force required to stretch the dough as well as the extent to which it stretches before breaking. The doughs were made with water contents predetermined for each flour by extrusion tests. Under these conditions the force required to stretch the dough, given by the height of the curve, is related to the spring or elasticity, while the length of the curve gives a measure of extensibility (Fig. I).

Sub-division of Flours

The flours were also examined by a biscuit manufacturer who graded them according to whether they were satisfactory, borderline cases, or unsatisfactory for making hard dough biscuits. The flours in each group were not subdivided for order of merit.

It can be seen that the good flours gave doughs which had low spring and high extensibility figures. That both dough properties are important is revealed by comparison of certain samples which had similar spring but different extensibility figures or had similar extensibility but different spring figures. Samples 312, 309, and 314 all had spring figures of 2·1 but sample 312 with the highest extensibility of 20 was graded good, sample 309 with an extensibility of 15 was graded moderate, and sample 314 with the lowest extensibility of 13 was considered unsatisfactory. Two samples had extensibility figures of 14·5; sample 311 with the lower spring of 2·0 was graded moderate while sample 317 with the higher spring of 2·6 was considered unsatisfactory.

Manufacturing Tests

Other collaborative tests* have been made with different biscuit

* P. Halton and E. N. Greer, "The Examination of Biscuit Flour Doughs by Load-Extension Tests." *Journal of the Science of Food and Agriculture*, 1950, No. 12, pp. 358-360.

TABLE 1

EXTENSIBILITY AND SPRING OF DOUGHS MADE FROM WHITE FLOURS MILLED FROM DIFFERENT SAMPLES OF ENGLISH WHEAT

Sample no.	*Dough extensibility*	*Dough spring*	*E/S*	*Biscuit makers' comments*
315 ..	21·5	1·5	14	Good
307 ..	19·0	1·7	11	,,
310 ..	19·5	1·8	11	,,
313 ..	18·0	1·8	10	,,
312 ..	20·0	2·1	9	,,
309 ..	15·0	2·1	7	Moderate
311 ..	14·5	2·0	7	,,
314 ..	13·0	2·1	6	Unsatisfactory
317 ..	14·5	2·6	6	,,
308 ..	14·0	2·9	5	,,
316 ..	12·0	2·6	5	,,

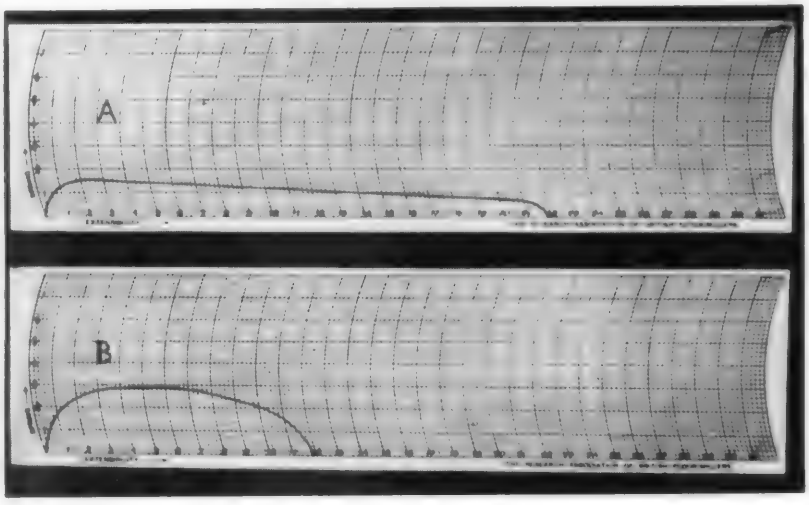


Fig. 1. Extensometer curves showing the difference in the stretching characteristics of doughs made from a satisfactory (A) and an unsatisfactory (B) biscuit flour.

manufacturers and the results obtained have confirmed those given in Table 1 and have shown that for hard dough biscuits the rheological properties of the dough are important. Further work with other types of biscuit may result in similar findings, in which case it may be possible to characterise the flour required for any given biscuit by means of dough tests. This would be one step towards obtaining a specification of biscuit flour quality.

It is well known that the characteristics of flour proteins are strongly influenced by variety and that of the wheats grown in Britain some, such as Holdfast, tend to give doughs which are sufficiently elastic to be suitable for bread-making but unsuitable for biscuit making, while others, of which Little Joss is a good example, are the opposite and tend to give soft inelastic and extensible doughs.

Locality of Growth

While flour milled from different varieties tends to give varying types of dough, the actual characteristics depend on a number of factors including the nature of the soil in which the wheat was grown. This is well illustrated by the data given in Table 2 obtained on white flours milled from four varieties of wheat each grown in three different places.

It can be seen from the extensometer figures given in this Table that, with each variety, the sample grown at Berkhamsted gave the least elastic and most extensible dough while that grown at Tring gave the most elastic and least extensible dough. These differences, resulting from place of growth, are so marked that with some of the varieties the Berkhamsted wheat gave a satisfactory, and the Tring wheat an unsatisfactory, biscuit flour.

The protein figures for some of the samples are also given in Table 2 from which it will be seen that in the case of N59 and Little Joss the Berkhamsted wheats had the highest and the Oaklands, not the Tring, wheats the lowest protein content. Thus the differences in the dough characteristics of the three samples of each variety do not run parallel with the differences in their protein content, indicating that when the same wheat is grown in different localities factors other than a change in protein quantity may affect the characteristics of the dough.

Manurial Treatment of Wheat

The effect of manurial treatment of growing wheat on its protein content and dough characteristics is shown in Table 3. In this experiment the sample without manurial treatment and that given two spring dressings of nitrochalk were both grown on the same plot.

It will be seen that this treatment increased the protein contents of the wheats, the increase varying with the different varieties. It also resulted in a change in the physical characteristics of

TABLE 2

EFFECT OF PLACE OF GROWTH OF WHEAT ON EXTENSIBILITY AND SPRING OF DOUGHS AND ON PROTEIN CONTENT OF WHEAT

Wheat variety	*Place where grown*	*Dough extensibility*	*Dough spring*	*E/S*	*Wheat protein* (%)
N59	Berkhamsted	18·5	1·70	11	10·4
	Oaklands	14·0	1·90	7	8·2
	Tring	13·5	2·40	6	9·7
Pilot	Berkhamsted	19·0	1·55	12	10·0
	Oaklands	13·0	1·40	9	—
	Tring	12·0	2·20	5	9·1
Little Joss	Berkhamsted	30·0	0·90	33	10·4
	Oaklands	18·0	1·45	12	8·4
	Tring	17·5	1·90	9	9·4
Scandia	Berkhamsted	24·0	1·20	20	10·6
	Oaklands	15·5	1·60	10	—
	Tring	13·5	2·30	6	9·4

TABLE 3

EFFECT OF NITROGENOUS DRESSING OF WHEAT ON EXTENSIBILITY AND SPRING OF DOUGH AND ON PROTEIN CONTENT OF WHEAT

Variety	*No manurial treatment*			*Two spring dressings with nitro chalk*		
	Extensibility	*Spring*	*Wheat protein* (%)	*Extensibility*	*Spring*	*Wheat protein* (%)
Bersée ..	29	1·4	9·8	29	1·3	10·8
Hybrid 46 ..	18	1·8	8·7	21	1·6	11·3
Little Joss ..	25	1·6	9·4	31	1·3	12·2
N59	16	2·3	9·6	20	2·0	11·1
Pilot	15	1·8	8·5	20	1·6	10·3
Scandia ..	21	1·8	9·9	24	1·6	12·8
Vilmorin 27 ..	15	2·2	9·2	21	1·9	11·9
Mean	20	1·8	9·3	24	1·6	11·5

the doughs made from the milled flours, in that the elasticity of the dough was decreased, and its extensibility was increased. Bersée, whose protein content was least affected by manurial treatment, showed little change in dough properties. From the result of these tests it would follow that manurial treatment can give wheat of improved quality for making biscuit flour, although this has not yet been confirmed by baking tests.

Wheat Protein Content

The figures given in Table 4 are taken from a survey of standard wheat varieties carried out at the Cereals Research Station in association with the National Institute of Agricultural Botany during the seasons 1947, 1948, and 1949. Each figure for mean protein content was obtained from 28 samples of the variety from trials in which all the wheats were grown alongside each other.

TABLE 4

MEAN PROTEIN CONTENT AND RANGE OF PROTEIN CONTENT IN ENGLISH WHEAT VARIETIES

(13·5 per cent. moisture basis)

Variety	*Mean protein content* (%)	*Range of protein content* (%)
Bersée	9·8	8·0-11·7
Holdfast	10·3	8·0-12·5
Jubilegem	9·4	7·6-11·9
Juliana	9·5	7·8-11·6
Little Joss	9·7	8·5-12·8
Redman	10·1	8·4-12·8
Rivett	9·8	8·2-12·5
Squarehead's Master	10·2	8·5-12·6
Squarehead II ..	10·3	8·4-13·2
Stedfast	9·2	7·8-11·4
Victor	9·2	7·7-11·2
Vilmorin 27 ..	10·2	8·8-11·4
Warden	9·6	7·9-11·6
Yeoman	9·7	8·0-12·9
		Total range
Mean	9·8	7·6-13·2

To this list might be added the probability that Atle wheat would have a mean protein content around 10 per cent. and Nord Desprez, Staring, Hybrid 46, and Pilot values about 9·5 per cent., although comparable data are not available.

The main result suggested by this Table is that although English wheat can vary in protein content from less than 8 to more than 13 per cent., all its varieties are practically equally adaptable in this respect and their mean figures do not vary by much more than 1 per cent.

With English wheat showing such a marked variation in protein content it is to be expected that they would also differ considerably in dough characters. It has been said that biscuit flour should be milled from weak wheat of low protein content. Some of the data presented in this article show that this is not correct, since low protein may result in low extensibility. On the other hand, while high protein often results in high extensibility the dough may at the same time be too elastic for satisfactory biscuit making quality.

TABLE 5

EXTENSIBILITY AND SPRING OF DOUGHS MADE FROM ROLLER-MILLED WHITE FLOURS AND FROM WHOLEMEALS HAMMER-MILLED FROM SAME WHEATS

Wheat	*White flours*			*Wholemeals*		
	Extensibility	*Spring*	*E/S*	*Extensibility*	*Spring*	*E/S*
Little Joss ..	31	1·3	24	28	1·2	23
Bersée ..	29	1·3	22	21	1·5	14
,, ..	29	1·4	21	21	1·4	15
Little Joss ..	25	1·6	16	21	1·5	14
Scandia ..	24	1·6	15	25	1·5	17
Hybrid 46	21	1·6	13	18	1·6	11
Scandia ..	21	1·8	12	18	1·6	12
Pilot	20	1·6	12	15	2·1	7
Vilmorin 27 ..	21	1·9	11	17	1·6	10
N59	20	2·0	10	16	2·2	7
Hybrid 46	18	1·8	10	14	2·0	7
Pilot	15	1·8	8	12	2·1	6
Vilmorin 27 ..	15	2·2	7	14	2·0	7
N59	16	2·3	7	13	1·8	7
Holdfast ..	12	2·6	5	10	2·6	4
,, ..	11	4·5	3	10	2·9	3

Wholemeal Tests

The extensometer figures presented in Tables 1 to 3 were obtained on doughs made from white flours milled on a Buhler laboratory mill. Such milling equipment is not in the possession of all millers; tests have been made therefore to determine whether satisfactory evaluation of quality could be obtained from tests made on flours or meals prepared by simpler means.

Comparative figures for a number of wheats obtained from extensometer tests made on Buhler milled white flours and on 100 per cent. wholemeals prepared on a Christie and Norris laboratory hammer mill are given in Table 5. The samples are arranged in order of merit as judged from the white flour tests.

While the figures for the wholemeal doughs place the samples in a rather different order, they do show the same general trends of decreasing extensibility and increasing spring from top to bottom of the Table. It seems probable, therefore, that the wholemeal test could be used to select wheats which are definitely suitable or unsuitable for milling into biscuit flour. The intermediate class could, if necessary, be blended with the most extensible wheats.

Correspondence

To the Editor of

FOOD MANUFACTURE

Ham Canning

DEAR SIR,—I see from your issue dated March 1, page 100, that you have a note on Mr. Jump's comments on the canning of ham.

In view of the recent troubles which have arisen from defective canned ham from abroad, I think it would be wise if you were to point out that one very important factor has been omitted by Mr. Jump, and that is the sewing up of the open ends of the boned ham with string. String is full of many varieties of micro-organisms and, moreover, by sewing the ends of the ham, after removal of the bone, heat penetration is prevented and consequently the hams are nowhere near so well sterilised.

Yours faithfully,

THOMAS MCLACHLAN.

London.

New Seal for Food Packs

FOLLOWING initial development in the United States, a new side-seal cap for food jars has made its appearance in Australia.

The principal advantages of this combination of special sealing compound, cap, and application are:

1. Controlled thermoplasticity of the baked film produces a gasket which moulds itself to the jar, despite irregularities, permitting wider tolerances in glass finishes.
2. Sealing at the side, corner, and top provides a more positive seal than may be expected of a cap which seals only at one or two of these points.
3. The cap is easy to pry off with an ordinary tin opener and as it is claimed that it will not distort when initially removed, it can easily be replaced.
4. Corrosive factors are minimised by the cap design.
5. The short skirt length of the cap saves metal.
6. The contour of the cap's panel provides a raised rim that permits the stacking of sealed tumblers on each other without slipping.

Present side-sealing equipment, with only minor modifications, may be used for the application of the new caps which are suitable for a number of different glass container finishes, including beaded and straight-sided tumblers.

Since the cap is held on primarily by vacuum, its use to date has been restricted to packing conditions where vacuum closing is desired or where natural vacuums develop upon cooling of a hot processed product.

Composition of Sealing Compounds

The special sealing compound, comprising 100 per cent. solids, is based on one of the recent vinyl chloride resin formulations, capable of a high speed automatic application as a flowed-in gasket thicker than hitherto possible with rubber flowed-in sealing compounds. Because of its nature, there is no loss of volume when the material is baked into a film. The baking cycle is approximately 60 seconds at a temperature of 350°F., in comparison with the customary two hours required for drying current water-base rubber compounds.

Thick and pasty at room temperature, the compound is applied warm from a controlled temperature recirculating unit, and since viscosity is an inversely proportional function of temperature up to about 125°F., closer control of gasket film weights resulting in uniformity and economy are reported to be possible.

Characteristics of Film

The film formed from the compound is tough and rubberlike; it can be modified for desired sealing characteristics by formulation. A light wax-lubricated surface develops after a week's ageing of the film, this being the only change.

It is its slight thermoplasticity which allows the film to conform to any irregularities of the individual glass finish, thus permitting a wide latitude of dimensional tolerances.

Crisp Packaging Streamlined

IN a plant recently put into production in Dallas, U.S.A., potato crisps move from the continuous frying plants by an overhead conveyor to seven automatic machines which bag 11,000 lb. of crisps every hour. This output was made possible by compressed air, the use of which speeded the packaging rate to coincide with the processing rate.

The crisps are diverted from the conveyor to the individual packaging machines by automatic ploughs. The product passes into a hopper through gates actuated by the machine itself, the total amount of crisps depending on the size of the bag being filled. This is one of the latest developments for controlled feeding to automatic machinery.

Crisps accumulate in a hopper before entering the bagger. A feeder gently separates this accumulation and carries the crisps down a plastic chute in a steady stream to the scale hopper. The rate of feeding the hoppers determines the number of bags per minute that will be filled. As the scale beam tips at the required weight, an air blast momentarily closes the gate of the filling chute.

Another controlled blast of air gently sweeps the crisps off the scale hopper and out through the black plastic spout on the front of the machine into a bag positioned by the rotary bag holder. It is not necessary to tip the scale hopper to evacuate it, thus eliminating the need to wait for the hopper to return to position. The machine is so fast and continuous in its action that it does not depend upon the normal power of gravity.

The bag holder is a rotary wheel synchronised with the speed of the feeder and weigher. As the wheel revolves, an operator slips a bag on one of the 15 "heads." Shaped like a scoop, each head keeps the bag open and a spring clamp holds the bag in place until filled. This clamp is designed so that, as the wheel revolves away from the black filling spout, an automatic trip releases the clamp and the filled bag drops gently on the belt that takes it away for sealing.

The filled double-waxed bags are fed into a machine to be automatically folded, sealed, and stapled. At the same time the wax is heated to secure an air-tight seal.

Tomato Purée in Portugal

(*Continued from page 133*)

kept for at least one month and are inspected daily when any defective cans are removed. Finally, when ready for shipment, they are inspected by the *Junta Nacional das Frutas*, a Government body supervising all such shipments from Portugal to ensure that only sound merchandise is exported.

SUPPLIERS OF EQUIPMENT

Boiler: *Babcock and Wilcox.*
Washing tanks, elevators and overhead conveyors, and stainless steel wagons: *Constructed in the factory.*
Separator, Inox. metal screens, self-operating valves and recorders: *Tito Manzini and Figli (Italy).*
Conveyor belts: *Begg, Cousland and Co.*
Preheating machine, pulper, vacuum concentrators, and sterilising and filling machines: *J. Vieira Jr. (Portugal), all modified in factory.*
Constant reading refractometers: *Optique et Precision de Levallois (France).*
Pumps: *Sulzer (Switzerland).*
Seamers: *H. Sudry (France).*
Office lighting: *Sylvania Day-light (U.S.A.).*
Cans: *Soc. Metalurgica & Litografica (Portugal).*

Vitamin B_{12} and Food Production

Now known as a red-coloured crystalline substance containing cobalt, vitamin B_{12} was first investigated as a factor present in liver which was effective in treating pernicious anaemia in humans. Later it was "rediscovered" as a growth stimulant necessary for the well-being of pigs and poultry. The interplay between the medical and agricultural fields of research in the development of our knowledge of vitamin B_{12}, and the extension of this joint interest to aureomycin and other antibiotics, were among the topics discussed at a recent meeting of the Nutrition Society.

MORE than 20 years ago Minot and Murphy made the outstanding discovery that pernicious anaemia could be cured by treatment with large doses of liver. Evidence by Castle soon followed to show that two factors were concerned. Thus in the healthy subject the stomach walls secreted an "intrinsic" factor which was necessary for the absorption and utilisation of an "extrinsic" factor. This second factor, which is now familiar to us as vitamin B_{12}, had to be supplied in the diet.

Shortly after Castle's observations Mapson reported the discovery of "physin," a name implying growth-promoting power which he gave to a principle which was also present in liver. In his experiments at Cambridge he administered this material, which is a concentrated source of many dietary factors, to young rats which were receiving a diet containing all the vitamins then known. Invariably the rate of growth was raised above the level which he considered normal.

Alternatively the liver could be given to the mother rat during lactation, and the growth of the young improved by the transfer of physin through the milk. No study was made of the anti-anaemic power of physin, but subsequent developments have made it highly probable that Mapson's observations amounted to an independent recognition of the existence of vitamin B_{12}.

The Animal Protein Factor

For about 15 years these findings remained unexplained, while progress to isolate Castle's extrinsic factor was slow. Within the last five years, however, rapid strides have been made, and new fields of interest have been entered. With an acute shortage of meat, following the increased demands and local failures in production which were experienced during the war, it became more than ever desirable to raise farm animals as efficiently and as cheaply as possible.

Numerous attempts were made, particularly in America, to raise pigs and poultry on inexpensive vegetable rations. The soya bean, which is very rich in protein, was given extensive trials, but the animals failed to thrive as might have been expected from the quantity and quality of their protein allowance. Supplements of the known vitamins were ineffective, but good growth was obtained by giving fish meal, liver, and other foodstuffs of animal origin. The existence of a growth-stimulating "animal protein factor," which obviously had great economic importance, was therefore assumed. In effect it appears that physin was rediscovered, and was given a new name.

The Role of Micro-organisms

Having touched upon the fields of human medicine and animal husbandry, the line of progress next made a significant advance into the realms of microbiology. In studying factors which increased the growth of *lactobacillus lactis*, Marie Shorb found that liver extracts were effective, and reached the important conclusion that there was a correlation between their potency in promoting bacterial growth and their anti-anaemic activity.

Another link with micro-organisms was established by Bird and other workers in poultry research, who made the rather surprising discovery that cows' dung was a potent source of the animal protein factor. Since cows subsist entirely on herbage and other vegetable materials it was obvious that the growth stimulant was made either by the tissues or, as seemed much more likely, by the micro-organisms present in the rumen or intestines.

The Isolation of Vitamin B_{12}

The final proof that the anti-anaemic, animal protein, and bacterial growth factors were different descriptions for the same substance followed soon after the isolation of pure vitamin B_{12}, which was effected from both liver and microbial products.

Almost simultaneously with American workers, Lester-Smith in Britain succeeded in obtaining the pure compound from liver. His procedure depended mainly on the absorption of the active fraction on charcoal, followed by elution and chromatographic adsorption on a column of aluminae. The many intricate operations were facilitated when it was realised that the vitamin was coloured, which allowed its position on the adsorption column to be detected as a bright pink region.

When purified, the vitamin formed dark red crystals. Chemical analysis revealed the unexpected presence of cobalt, and the rest of the large molecule had another remarkable feature in containing a cyanide group. In the cure of pernicious anaemia minute daily doses of 1 microgram were effective, which is about 25,000 times less than an adequate dose of vitamin C.

Enter Aureomycin

No difficulty was experienced in proving that vitamin B_{12}, whether isolated from liver or from micro-organisms, was entirely adequate as a source of the anti-anaemic factor. Jukes and his colleagues, however, soon sus-

pected that some other growth-promoting factor must accompany vitamin B_{12} in its microbial sources.

As a source of the vitamin he had been using the culture medium of *Streptomyces aureofaciens*, which was grown for the main purpose of obtaining a medicinal product in the form of the antibiotic aureomycin. It was noticed that the growth-promoting power of the crude culture medium was greater than could be accounted for by its contents of vitamin B_{12}. Although there was no reason to suppose that aureomycin, which bears no close resemblance to vitamin B_{12}, should promote growth it was found that its administration, in conjunction with vitamin B_{12}, completely reproduced the potency of the crude material.

Thus during the manufacture of an antibiotic primarily intended to combat human diseases, Jukes had first found a useful application for an important by-product in animal husbandry, and had followed up this development by showing that his main product could be put to the same purpose. Growth-promoting power, moreover, was not a specific property of one antibiotic, since penicillin and terramycin were also found to be effective.

Divergent Experiences

In experiments carried out in Britain the advantages of giving either vitamin B_{12} or antibiotics to farm animals have been less clearly demonstrated. Poultry have been the main subject of research, and it has been shown by Carpenter that most of the diets used under practical conditions in the U.K. contain enough fish-meal, or other forms of animal protein, to render supplementation with vitamin B_{12} unnecessary.

With antibiotics the situation is more obscure. Using the same diet antibiotics have been found to increase growth in some laboratories, but not in others. At Reading, Coates and Kon, with other colleagues, have found that the administration of an antibiotic will improve the growth of their chicks when they are kept in an old animal room, but will not affect the growth of similar chicks, given the same basal diet, when they are kept in a new animal room on the same premises.

The most obvious explanation of this disparity relies on the fact that treatment with antibiotics is helpful in the face of an unfavourable bacterial environment, but not otherwise.

The Deep Litter System

On this assumption the antibiotics lose their novel role as direct growth stimulants, and exert their favourable influence as a secondary effect of the ability to check bacterial growth which their name implies. It is clear, however, that mere cleanliness is not essential for rapid growth, and that bacteria are not necessarily objectionable if they do not cause disease.

The ability of chickens to thrive under conditions designed to allow a profuse multiplication of micro-organisms has been proved by the success of the deep litter system. The birds are kept enclosed without cleaning the floor, and as their droppings fall they are allowed to accumulate in a layer of peat, or other porous material. The room is kept warm to encourage bacterial growth, which in turn gives rise to more heat and keeps the litter dry.

It is not clear yet whether the good health of chicks kept under these conditions depends upon the production of vitamin B_{12} or antibiotics by the micro-organisms which the method encourages, or upon other factors. It is possible, for example, that the dry state of the litter may prevent infection of the birds with parasites.

Vitamin B_{12} and Ruminants

It will have been noticed that while vitamin B_{12} requirements of humans, rats, pigs, and poultry have been discussed no mention has been made of sheep. It has been stated that cows' dung is a rich source of the factor, and the inference will have been drawn that the ruminants in general are able to derive adequate supplies from the profusion of micro-organisms which are concerned in their complicated digestive processes.

Reference may be made to the interesting condition known as "pine." This well-known condition afflicts sheep in certain geologically determined areas of Britain, and notably in Scotland. The affected animals are often so stunted in growth as to be commercially valueless, but the disease may readily be prevented by dressing the defective pastures with inorganic cobalt salts.

The complete story has still to be elucidated but it may perhaps be surmised that while non-ruminants must be supplied with combined cobalt, in the form of vitamin B_{12}, ruminants can suffice with elementary cobalt to satisfy the requirements of the micro-organisms which inhabit their rumens.

Some Outstanding Problems

Research on almost all the topics which have been discussed is still advancing, and fresh developments in the near future seem inevitable. One point recently established, for example, is the extracts of cows' faeces give different results for vitamin B_{12} according to whether they are tested by their growth-promoting powers in micro-organisms, such as *Euglena gracilis*, or in chicks. The presence of factors other than vitamin B_{12} which are capable of supporting growth in micro-organisms, but not in chicks, seems highly probable.

It is certainly remarkable that both vitamin B_{12} and the antibiotics should have been relegated, after their first welcome as agents for combating deadly human diseases, to additional humbler duties in aiding the cheap production of such familiar commodities as bacon and eggs.

With vitamin B_{12} there seems no objection to this additional function. With the antibiotics, however, the inexpert mind may harbour a suspicion that a too widespread usage may conceivably encourage the production of strains of resistant bacteria. If this contingency were even vaguely possible it would seem tragic to encroach on the value of the antibiotics in medicine to enjoy a less important gain in food production.

The Evolution of a War-time Ministry

WHEN Lord Beveridge wrote his history of food control in the first world war, Lord Rhondda was already dead and by virtue of that fact and of the pioneering quality of his exploits, the story could be cast into the mould of an epic. In the compilation of his book,* Mr. Hammond has none of these advantages. His narrative is necessarily complex and many stranded; moreover, the Ministry of which he writes is still in existence. He must know far more than he tells us; at moments there is a feeling that a pleasant piece of revelation is being cut short as by a pair of administrative scissors.

Yet for those of us who lived through the experiences and had some part in them the book repays careful study. It shows something if not all of what really happened, and that is perhaps the main attraction to us of a history of recent events. Strictly speaking, the second volume should be awaited in order to view the work in its entirety, but since this might mean an interminable delay, we may follow the author in accepting his more restricted field.

How Policies are Fashioned

In an earlier volume of the series Prof. R. M. Titmuss dealt with the growth during the war of the social services which are now part of our daily lives. That was a useful and relevant enquiry, but while food control is still with us, the substance of it has in many respects changed. It has become a tedious ghost haunting our days. Whatever controls should have profitably survived the war, they were certainly not the kind we now endure. The value of Mr. Hammond's work lies, therefore, in the light it casts on the way policies are fashioned and carried into effect, on the curious interplay of social and administrative forces that emerge in definite lines of action. It is a pity that he did not himself realise fully that this is the basic subject of his enquiry, for at times he misses chances of revealing the inner pulls and checks, and conflicts and resolutions that are the stuff of which Ministries are made.

Trade Concentration

Obviously a reviewer has to pick his path among the inviting avenues. Consider the painful subject of trade concentration (Chap. 25); it seems to have been mainly a three-cornered game played over 1941-43 between the Ministries of Food and Labour and the Board of Trade. Its rules apparently resembled those of beggar-my-neighbour, and the stakes were labour releases. It must be said, by the way, that the yields from the food industries were not high. The Ministry of Labour had estimated a release of some 30,000 from the biscuit, bacon curing, chocolate confectionery, soft drinks, and a few other industries. As it happened, "releases from two of the three industries, from which most were expected, seem to have been exceedingly small—600 to 650 from biscuits, about 150 from soft drinks. Total releases on account of food concentration may have been as little as the 1943 estimates, *i.e.* about 15,000 insured workers." The amount of factory and storage space obtained was by December, 1942, some 4½ million sq. ft. This may have increased during 1943; but "it must have been small compared with the 70 millions yielded up to March, 1944, by the Board of Trade industries, and the 220 millions requisitioned by the Factory and Storage Control after mid-1941."

The trouble was that the Commodity Divisions knew the problems of the industries with which they were concerned, and were aware how little they knew about the labour conditions in the several firms. "If to other Departments Commodity Divisions appeared sluggish and obstructive, they for their part often felt that the instructions they received from the centre had been drawn up without regard to the idiosyncrasies of their particular industry."

Requisitioning of Factories

One of the earliest hazards was the requisition of two modern Co-operative bacon factories. "Not only the Co-operatives but the Trade Unions were up in arms at once and appealed to the Deputy Prime Minister. Matters were made worse by the fact that many displaced workers were transferred to other and, as was alleged, less desirable bacon factories. The odium it had incurred, coupled with the almost negligible release of labour that resulted from the bacon-curing scheme, made the Ministry distinctly less willing to fall in with the behest of the other Departments on later occasions."

The Ministry of Labour continued to press. It wanted factories closed altogether in the difficult labour areas. It wished the Ministry of Food to select these factories for its redundancy list, quite apart from any convenience to food production and zoning, and to withdraw their raw materials.

But the Ministry of Food was not prepared to withdraw raw materials merely to release undirectable labour; in fact it soon came into undesirable conflict with a large factory in Willesden, that produced starch food powders. There was a long case before the Courts, and though the Labour Ministry had its way, "the moral victory lay with the company, obstructive and disagreeable though it may have been."

"Nor was this all. The best use the Board of Trade could find for the factory was the storage of baby carriages, while of 27 workers employed there all but two turned out to be undirectable part-timers."

A further case arose about a soap firm that persisted in arguing its point. "The Division would have been prepared to enforce closure by withdrawing the company's licence, had not doubts about the legality of so doing led to reference upwards and

* *History of the Second World War. Food. Vol. I. The Growth of Policy.* By R. J. Hammond, M.A. Pp. 436+xii. H.M.S.O., and Longmans, Green and Co. Price 25s.

eventually to an exchange of letters between Lord Woolton and Mr. Bevin, in which the latter decided not to press his Department's point. The soap company by refusing to budge had triumphed over three Government Departments."

Food Standards and Labelling

A somewhat more profitable field lay in the work of the Food Standards Division of the Ministry, and it has been said that here at least the war-time Ministry has left the country a valuable heritage. The foundations, which were firmly laid during the war, are still being built upon. Mr. Hammond devotes a chapter to the subject; it will deserve more ample treatment in the future.

On food standards and labelling Mr. Hammond gives us an insight into the kind of inter-departmental and Cabinet conflicts that took place before the work could get under way. "The Ministry was influenced by stringencies of supply, by the need to economise in labour and transport, by the need to protect the public against exploitation in prices or quality, and by an enlightened opportunism which saw in the very existence of war-time controls a means to make permanent reforms in the standard of manufactured food." It was the last of these factors that ultimately affected decisions.

Reforms were certainly long overdue, and it was realised that they were in the interest of manufacturers no less than of the public. In a sense "a manufacturer who used his ingenuity to stretch scarce ingredients by the addition of, say, a little wheat flour might be said to be performing a public service, but there was nothing at all to be said in favour of milk substitutes, made of flour, salt, and baking powder, and sold at 5s. a lb., or of onion substitutes containing merely water and a smell!"

Orange Juice

There were countless difficulties and delays. The author cites, for instance, the problem of the Ministry's own orange juice. The juice contained sulphur dioxide as a preservative, as it was legally entitled to do. Should this critical fact be revealed on the label? "Those who feared that suddenly to reveal the presence of a preservative would depress the already unsatisfactory take-up of orange juice, proposed that a standard should be prescribed for it. . . . This could scarcely be decently done for orange juice unless a standard was prescribed for other vitamin C preparations. . . . Reluctantly it was decided that both blackcurrant syrup and the Ministry orange juice must comply with the Order—a salutary lesson for the Departments of the effect of their own regulations. There is no evidence that the consumption of orange juice suffered as a result."

Mr. Hammond is justified in his comment on a later page that "it was the Ministry's close relations with the food trades that gave it so great an advantage in matters of this sort"; he pays a tribute to the way in which the Ministry's Manufactured Foods Adviser had "since 1941 worked steadily, ingeniously, and unremittingly to put teeth into the 1938 Food and Drugs Act." He concludes his survey by saying that "the Ministry's reforms in the field of standards of labelling would stand out as a solid gain, unobtrusively snatched from the years of austerity."

Food Scientists and Economists

He seems less happy in his estimate (Chaps. 28 and 29) of the part that was played by food scientists and economists. The General Department of the Ministry, set up by Lord Woolton, was more than "a symbol of the intellectual unity of food control." It provided the Minister with a necessary counterbalance both to the specialised Divisions and to the food trades.

If Mr. Hammond rejects the charge of the Commodity Divisions that this General Department was often academic in its proposals, it is not quite clear that he does not hold this view himself. He agrees that "the briefing of the Minister and his senior advisers for interdepartmental and international discussions was almost invariably efficient, pointed, and lucid," earlier he suggests that "scientific advice was useful to administrators, but economic advice was not, either because it was impracticably remote, or because untrained common sense was held to be sufficient to solve the Ministry's general, as distinct from its technical, problems."

There is some truth in this. Yet the final judgment, after all, must lie with the Minister himself and with the Cabinet; a Minister confronted with the diverse interests of the various Divisions is well advised to strengthen himself with all the arguments with which economists can supply him.

It is doubtful again whether the writer, in referring to the "wild men" who were among others present at the Hot Springs Conference, does not tend mentally to take the inverted commas out of the phrase. He mentions that "there were within the Ministry of Food some who would have liked to go a long way with what London called the 'wild men' or the 'ginger group'—mainly of nutrition experts turned social and economic reformers — in Washington." The point we always have to recognise is that without these "ginger groups" an international conference or indeed a Ministry is apt to become a very sterile and lethargic affair. A food manufacturer dimly realises this at times in dealing with his scientific staff.

They do at least fix their attention on the important fact that food is meant for the sustenance of human bodies and should be so produced and distributed as to fulfil that purpose. In other words, they have their own part in the complex interplay of interests and principles, that emerges in the formation of national or international policy.

The volume closes with the cessation of hostilities. We may trust that it has nothing to teach us, for it deals essentially with the evolution of a war-time Ministry. Taken as a partial revelation of the way things happen, whether in war or peace, it is a salutary exposure of the convergent and often conflicting currents that compose our national administrative life.—F. LE GROS CLARK.

Food Developments

Storage of Frozen Peas

AN item of research on the storage of frozen peas by A. C. Wagenknecht was described in a paper presented at the Fourth Annual Food Processing Meeting of the N.Y. Agricultural Experimental Station.

Blanched and unblanched Thomas Laxton peas were lyophilised after five years of storage at 0° F. and the lipid material was extracted with peroxide-free anhydrous ethyl ether. Similar ether extracts were prepared from blanched and unblanched fresh peas of the same variety immediately after harvest.

Experimental results based on peroxide number, iodine number, and acid number, as well as on taste and odour, have shown that rancidity of the lipid material is one of the primary causes, if not the principal cause, of the development of off-flavour in unblanched frozen peas during storage at 0°F.

No change of significance was observed in the reducing and non-reducing sugar fractions and in the starch fraction. Thus it appears that these components of the carbohydrate fraction do not contribute to the development of off-flavour during the storage of frozen unblanched peas. No change was observed in total nitrogen content.

There was a considerable loss of chlorophyll and carotene during the protracted storage of frozen unblanched peas.

The changes which were observed in the lipid material and the destruction of pigments are considered to be largely owing to the action of lipase and lipoxidase during the storage of the frozen unblanched peas.

■

Zanzibar Lime Oil

IN VIEW of the ravages of "sudden death" disease on clove trees in Zanzibar, extension of the present production of lime fruit is being considered.

Since some of the fruit might be used for the production of lime oil, a quantity of the latter was prepared experimentally in the local Government laboratory. Partially ripe fresh fruits were minced and the mass was steam-distilled from glass flasks heated in oil baths to give a clear, pale yellowish-green oil.

This oil has been examined by Brown *et al.* (*Colonial Plant and Animal Products*, 1951, **2**, 1, 36) who have recorded its physical constants; apart from the rather high non-volatile residue (4·2 per cent.), these agreed closely with the values typical of West Indian distilled lime oil. The aldehyde content was 2 per cent. calculated as citral, this being higher than normal for the West Indian oil.

Samples submitted to commercial users of lime oil were considered to have a good fresh odour, but to lack the strength and body of the West Indian oil. This criticism applied also to the flavour when compounded in confectionery products.

It is suggested that the high citral content may account for the slightly inferior odour and flavour, and that better production methods might improve matters.

The authors conclude that the oil would probably have a smaller commercial value than West Indian lime oil if and when the latter is once more available in adequate quantity.

■

Smoke-curing of Fish

THE factors influencing the quality and degree of preservation of all types of smoke-cured fish from finnans to smoked salmon are described and discussed in a recent leaflet.*

For a first class smoked product the fish must be perfectly fresh initially; it should be carefully handled to avoid bruising and kept cool in ice until required for cleaning and splitting. The fish should also be in season.

When the fish is cleaned, care should be taken to remove all traces of gut, gills, membranes, and blood. There are numerous methods of splitting the fish, but in all cases a clean cut should be made, leaving no ragged surfaces.

Various types of smoked fish require different methods and amounts of salting to produce the desired flavour, firmness, and glossiness, but excessive saltiness should be avoided except in "hard" export cures.

Artificial colouring is generally used to improve the appearance. While dyeing is not in itself objectionable, the products may be moister, less smoky, and poorer in keeping quality, although superficially attractive, unless particular care is taken to smoke thoroughly.

The Torry Research Station kiln, details of which are shortly to be published, can produce uniformly good smoked fish more quickly and conveniently than the traditional rule-of-thumb methods.

The leaflet emphasises the points to look for in a well-smoked fish. Tables summarise the details of processing and the keeping quality of the products most familiar to the British consumer, and two appendices give tables for calculating strengths of brine and the moisture content of the atmosphere.

* *The General Principles of Smoke-curing of Fish.* Leaflet No. 13. Published for D.S.I.R. by H.M.S.O. Price 9d.

New Books Register

Orders for any of the books listed below, or scientific and technical books in any language, may be placed with the Books Department, FOOD MANUFACTURE, 17, Stratford Place, London, W.1. A selected stock of books is carried and may be inspected at the above address. Prices given do not include postage.

Smith, Henry. *Success in the Restaurant Business.* Practical Press. Pp. 75. 6s. 6d.

Loads, F. W. *Tomato Culture by Modern Methods.* C. A Pearson. Pp. 176. 20 illustrations. 12s. 6d.

FUTURE ARTICLES

ARTICLES to be published in forthcoming issues of FOOD MANUFACTURE will include an illustrated description of the canning of guavas and "Technological Developments in the Canning Industry," by C. Olin Ball.

News from the Industry

FORTHCOMING EVENTS

Society of Chemical Industry

A conference on "The Quality of Cereals and their Industrial Uses," organised by the Food and Agriculture Groups of the Society of Chemical Industry, in conjunction with the Scottish Sections of the Society, will be held in the Edinburgh Suite of the Assembly Rooms, George Street, Edinburgh 2, on May 8, 9, and 10, 1952. The following programme is being arranged:

Thursday, May 8.

Morning Session—Chairman, Sir Harold A. Tempany, C.M.G., C.B.E., D.Sc., F.R.I.C.

Opening Address by the chairman of the session.

"Cereal Agronomy" by F. R. Horne, M.A., N.D.A., N.D.D.

"Grain Protection" by G. V. B. Herford, O.B.E., M.Sc.

"Factors Influencing Cereals as a Food" by J. Duckworth, Ph.D.

Afternoon Session — Chairman, D. P. Cuthbertson, M.D., D.Sc., F.R.S.E.

"Agronomic Characteristics of Oat Varieties" by D. Cameron, B.Sc.

"Processing of Oats as Influenced by Agronomy" by J. Hutchinson, B.Sc., Ph.D., A.R.I.C.

"Utilisation of Cereal By-products" by K. C. Reid, B.Sc., A.R.I.C.

Evening Session—Chairman, F. J. Bolton, B.Sc., F.R.I.C.

Informal Dinner.

Friday, May 9.

Morning Session—Chairman, B. M. Brown, B.Sc., F.R.I.C.

"Testing of Seeds for Viability" by A. M. MacLeod, B.Sc., Ph.D.

"Selection of Barleys for Malting" by Professor I. A. Preece, D.Sc., Ph.D., F.R.I.C.

"Malting Systems" by R. M. Thomson.

Afternoon Session—Chairman, Professor H. D. Kay, C.B.E., D.Sc., F.R.S.

"Malting of Cereals other than Barley" by H. Potter, A.H.W.C., A.R.I.C.

"Uses of Barley other than Malting" by Professor S. J. Watson, D.Sc., F.R.I.C., F.R.S.E.

Evening Session — Chairman, Sir Patrick Laird, C.B., F.R.S.E.

"Biscuit Flours" by J. Sword, B.Sc., Ph.D., F.R.I.C.

"By-products of Wheat and their Nutritive Aspects" by J. Gordon Hay, F.R.I.C.

"Rye for Breadmaking" by Einar Möinichen.

Saturday, May 10.

Visits to places of agricultural and scientific interest are being arranged.

The registration fee for the conference will be 10s. for members of the Society of Chemical Industry, £2 for non-members, exclusive of the informal dinner. A form of registration, together with final details of the conference, can be obtained from the conference secretary, Mr. J. Saunders, B.Sc., 22, Buccleuch Place, Edinburgh 8.

Lecture Tour on Detergency

A lecture tour of South Africa, Rhodesia, and possibly East Africa, is to be undertaken by Mr. J. C. L. Resuggan, F.R.I.C., of The British Hydrological Corporation.

He will be accompanied on much of his tour by Mr. Leslie P. James, chairman and managing director of the company, who will be visiting the firm's factories and plants in the Union.

Long Service Awards

Between four and five thousand of Wall's employees attended the presentation of good service awards which took place at the Albert Hall on March 5. Prior to the address and presentation by Mr. Cecil W. Rodd, chairman of the company, guests were entertained by Charles Smart at the organ.

Among the 79 people who received gold watches for their 15 years' good service was Mr. Collan E. B. Brett, the company's bacon production manager.

After the presentations had been completed, the assembled guests enjoyed the cabaret and dancing.

Heating of Sugar Vats

An unusual and ingenious application of soil warming equipment (normally used for agricultural or horticultural purposes) has recently come to light in a Hampshire brewery. Three years ago, the brewers were faced with the problem of maintaining the temperature of sugar syrup in two 60-barrel capacity tanks at 110°F., with a minimum ambient temperature of 40°F. They approached The General Electric Co. and suggested that these tanks, which are 5 ft. 6 in. in diameter and 8 ft. high, should be heated by elements from the outside. This has been done by means of 15 s.w.g. galvanised soil heating wire laid on each tank in 12 sections of four turns each.

The sections are connected in parallel and fed from a 2·5 kVA soil heating transformer on a 15 volt secondary winding. They are controlled by means of a suitable calibrated long-stemmed thermostat inserted into the liquid near the bottom of the tank.

To support the bus-bars and wire spacers, studs were welded to the exterior of the tank at suitable intervals. The tank was then served overall with a layer of glass fibre cloth impregnated with special shellac "dope," wire spacers suitably slotted were placed in position, and the wire was wound on. Another layer of glass fibre cloth was then laid overall and the terminations of the windings brought out to the bus-bars held on the studs. Finally, two layers of cork slab lagging 1½ in. thick were put over the whole installation, and held in position by a sheet metal cover drawn tight by suitable tensioners.

Sardine Exports to Australasia

At the Centenary Dinner of the Leeds Chamber of Commerce held on February 29, Mr. C. W. Banks, Vice-President of the Chamber and chairman and managing director of British Fish Canners Ltd., told H.E. Sir Thomas White, K.B.E., High Commissioner for the Commonwealth of Australia, that his firm had canned and exported to Australasia during 1951 the huge total of between 80 and 90 million British sardines.

Treadle-operated Staplers

Stapling has been acknowledged over many years as a quick and reliable method of sealing fibreboard cases. Apart from the speed and general economy which stapling offers it has the added advantage that cartons so erected and sealed may be readily collapsed for return and further use, an important point where the most stringent economy must be exercised in the use of fibreboard containers.

Not all concerns have a scale of requirements sufficient to justify the installation of stapling equipment designed to form staples from the reeled wire, and apply them on a fully automatic basis. There should therefore be considerable interest in a smaller machine which, while being adaptable to all classes of work, is nevertheless much simpler in construction as it is designed to operate with pre-formed staples.

The new "Jordan" range of treadle-operated staplers uses staples manufactured from broad flat wire which will penetrate the toughest cardboard with ease.

International Sugar Exhibition

Among the exhibitors at the International Sugar Exhibition to be held in Amsterdam from April 23 to May 4 are W. J. Bush and Co. Their continental manager, Dutch agent and staff, and executives from London will be present.

Retirement

On February 29, a presentation was made to Mr. W. B. Dale, M.I.Mech.E., A.M.I.E.E., to mark his retirement as general manager of the electrical and controls department of Hopkinsons, after 31 years with the firm.

Mr. R. McKie, director and secretary, presented Mr. Dale with a cheque on behalf of the directors and general staff; another cheque from the staff and employees of Mr. Dale's department was presented by Mr. D. Crabtree, representing the workmen.

Mr. G. Savell, director and chief engineer presided.

Conveyor Systems

Conveyor equipment today is used in a large number of factories concerned not only with the actual production of foodstuffs but also with such allied trades as packaging. The saving in handling costs when conveyors are applied intelligently to a particular problem is quite considerable.

Teleflex Products have conveyors operating in factories dealing with, among other things, the curing of bacon, the manufacture of bread, and the conveyance of tins for the packaging of a large variety of food products; this last mentioned conveyor is one of the longest which has been installed for this particular type of unit.

The system is completely flexible, being made up of a number of standard components which can very easily be adapted to suit the layout of any particular factory. The actual motive power is supplied by a drive unit rotating a hobbed wheel which engages with the patent Teleflex cable.

In turn the carriers are fixed to this cable either by means of a claw block or by a brazed peg. Installation can be carried out under skilled supervision while production is actually going on and this in itself is a considerable advantage.

The conveyor division of the company has now moved from Chadwell Heath to Uphall Road, Ilford, Essex (Tel.: Ilford 3117). The remote control division is still situated at Chadwell Heath.

Acquirement of Practice

The practice of Hehner and Cox of 10, Billiter Square, London, E.C.3, has been acquired by Dr. Julius Grant, F.R.I.C., as from March 1, 1952.

Dr. Grant has informed us that he proposes to conduct the practice so far as possible on the same lines as hitherto, although he is, in addition, developing a department to deal specifically with paper, cellulose, and allied problems.

The Sabroe soft ice machine, showing the soft ice forming beneath.

Soft Ice Refrigeration

A new and improved method of chilling water, by which soft ice accumulated during 12 to 16 hours in off-peak periods can be melted away in a very short time owing to the enormous surface area of the soft ice, has been introduced by The Creamery Package Manufacturing Co. This can be achieved without essential rise in temperature of the chilled water led to the plate coolers. When a uniform distribution of the returning ice water over the entire soft ice basin is provided, temperatures close to 32°F. can be maintained as long as there is any soft ice in the tank.

These machines are manufactured in seven sizes capable of a daily demand for latent heat storage of one to a hundred tons of ice.

The ice produced is quite similar to crushed ice and, when the water is allowed to drain off, the residue resembles snow. The ice is formed on the inside of a stationary vertical cylinder which is double walled, ammonia being evaporated in the annular space, thus cooling the inner drum. The ice formations of ·004 in. thickness, on the inner surface of the cylinder, are removed by a rotating scraper. The crystals do not freeze together, but agglomerate to a spongy mass.

For thawing, cold ice from the bottom of the basin is drawn out by the ice water pump and circulated through the plate coolers, etc. The returning water is spread over the entire basin through a system of spray pipes. The water, which sinks through the soft ice, is effectively cooled before recirculation.

There is no risk of the ice choking the filters as the tendency of the soft ice to float in the basin keeps the water in the bottom of the basin free from any ice particles. Further, there is no danger of lime formation in the plate cooler as it is the same water which is recirculated.

Because the freezing cylinder is stationary, there are no stuffing boxes for the refrigerant and this possible source of trouble is thus eliminated. The annular space for the evaporating ammonia is accurately controlled by a reliable float valve system and the freezing cylinder is flooded with boiling ammonia while the vapour escapes quickly, without pressure drop into the liquid separator, which ensures dry, saturated vapour in the suction line to the condensing unit. The condensing unit can be erected beside the machine or remotely installed; furthermore, providing correct evaporation temperatures are maintained, the machine can be connected to existing condensing units.

The machine is installed above a basin, the size of which depends on how much ice needs to be accumulated. About 140 cu. ft. are required for each 2,200 lb. and the tank may be made of concrete, steel plate, or wood. To prevent dew, the tank should have a slight insulation and to save space, tanks are often submerged, uninsulated, in the ground.

High Protein Food

A concentrate of powdered brewers' yeast, yoghourted skim milk, molasses, and wheat germ in the form of palatable crisp flakes has been evolved by British scientists working at Beecham Research Laboratories.

Formation of Clarke-Built

Cherry-Burrell Ltd., a subsidiary of the American Cherry-Burrell Corporation, has been entirely reformed into a British company to be known as Clarke-Built Ltd., with Mr. Frank J. Clarke as managing director. The new company will continue to produce the same type of equipment as hitherto.

Mr. J. S. Menzies.

Appointments

Mr. J. S. Menzies has been appointed sales manager (home) for the Dairy Engineering Department of The A.P.V. Co. Mr. Menzies, who is a well-known figure in the dairy industry, has been a member of the APV Dairy Engineering Department Sales Staff for nearly 30 years.

Tercentenary of the Coffee House

The Lord Mayor of London, Sir Leslie Boyce, has unveiled a plaque to commemorate the first London Coffee House which three hundred years ago was in St. Michael's Alley, Cornhill, on the site now occupied by The Jamaica Wine House, an establishment that has carried on the traditions of a Coffee House as a meeting place for City merchants since the seventeenth century.

The plaque was presented by the Coffee Buyers' Association in the interests of the coffee trade and the coffee growing territories overseas. Other functions associated with the history of coffee will also be organised by the Association during tercentenary year.

Tubes for the Food Industry

Over 25 years ago Accles and Pollock commenced the manufacture of seamless stainless steel tubes, their present range extending from ·002 in. outside diameter up to 7 in. The tubes can be supplied in varying finishes and usually have a high polished finish inside or out, or both, as required for the food industry.

Carbon steel tubes up to 4 in. in diameter are also made by the company and any quality can be manipulated.

Stainless steel tubes can also be supplied in over 200 different shapes and sections just as simply as a carbon tube can be supplied.

Sales Management

The qualifying and final examinations in "Sales Management" will be held in London and various provincial centres on May 22, 23, and 24, 1952.

Entry forms and particulars may be obtained from the Secretary, I.S.M.A., 4, Holborn Place, London, W.C.1. Closing date for entries will be April 30, 1952.

In 1953, a revised six-subject qualifying examination will be introduced in lieu of the present qualifying examination, consisting of three subjects only, thus bringing this examination into line with the National Certificate Scheme in Management Studies.

Use of Systemic Insecticides

An interesting talk on the work done by the pest control research team attached to the West African Cocoa Research Institute, founded by Sir Harold Tempany, was given by Dr. W. E. Ripper, managing director of Pest Control Ltd., whose company entertained the Press at a recent luncheon. Based on the fact that systemic insecticides have been found to cope with the problem of aphids and spiders on hops and strawberries and later on fruit trees, vines, sugar beet, potatoes, beans, peas, and other crops, experiments were conducted with a view to applying the same principle to the control of the swollen shoot disease of cocoa trees.

The success in finding such an insecticide, which is completely decomposed in the tree, is the outcome of prolonged biochemical work carried out by Dr. Heath and his colleagues in Dr. Hartley's research laboratories at Harston. This resulted in the production of "Hanane," named after Dr. Hanna, who led the team.

This chemical is a mixture of bis (dimethylamino) fluorophosphine oxide and bis (dimethylamino) phosphonous anhydride.

In the laboratory Hanane is oxidised only by vigorous oxidising agents, but in plants it is enzymatically oxidised to amino-phosphonic acids of a lower degree of alkylation, and finally to orthophosphate, the fluorine becoming detached during the oxidation and forming calcium fluoride.

Under an arrangement made by the Colonial Office in 1949, experiments with Hanane were started at the West African Cocoa Research Institute to control the vector of swollen shoot disease and Dr. Hanna was able to demonstrate to leading scientists that the absorption of the Hanane by the cocoa tree makes the tree poisonous to the mealybugs. Other series of experiments all confirmed the efficacy of the treatment.

It is hoped that the combined methods of anti-mealybug treatments and cutting out will make it possible to stop the spread of swollen shoot and assist in the rehabilitation of the cocoa industry so that the Gold Coast will be able to maintain its position as the best cocoa growing area in the world.

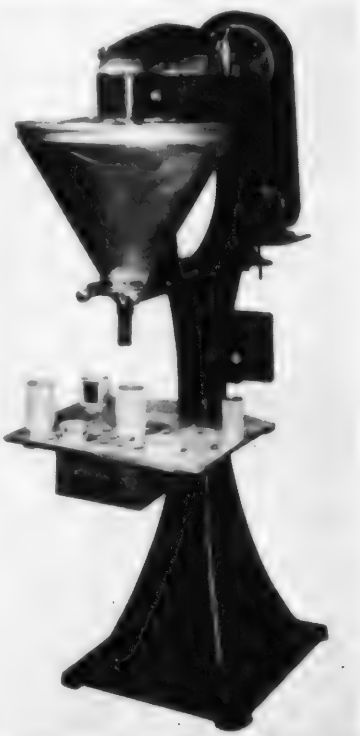
Filling, Sifting, and Mixing Plant

Among the equipment for filling, sifting, and mixing all classes of powder and granular materials manufactured by Alite Machines, is the standard loose filling machine which has a range of ¼ oz. to over 3 lb. with a high degree of accuracy. It can be supplied with automatic conveyor tables for drum shaped containers if required. Semi-automatic in operation, this machine can be used for a wide variety of containers, *e.g.* tins, bottles, boxes, and bags, and is easily stripped for cleaning and changing over to different materials.

Where materials require to be compressed into their containers the company's compression filling machine, with a capacity of 3 oz. minimum up to 14 lb. per fill, is recommended.

Sifting and blending operations can be effected in machines with outputs ranging from 56 lb. to 2 tons.

Designed to provide bulk supply to the filling machines thereby obviating the necessity for hand-feeding the filling machine hopper, the distributor elevator unit for single floor factories eliminates loss of time, additional labour, costs, and dust.



The standard loose filling machine has a range of ¼ oz. to over 3 lb.

Castors in the Factory

A new and additional factory has been opened on the main Bath Road of the Slough Trading Estate by Flexello Castors and Wheels, who produce over 200 types varying from light domestic to heavy industrial castors with load capacities up to 1,800 lb. each.

Several new castor projects are being actively developed, but among the many special features already well known as exclusive to Flexello, the solid hard rubber wheel with bonded soft tread is one of their greatest successes.

The way in which castors are used as aids to efficiency in this factory shows many unusual applications. One example is the saving of much space in the loading bays where loaded stillages stand in close rows with only enough space between them for the fork lift trucks to travel but not to turn. Any required stillage is quickly pushed into the gangway for a straight pick-up on the fork. The stillages can then be pushed into any position on the trucks or lorries to which they are loaded.

Physical Society Exhibition

The feature exhibit of Cinema-Television at this year's show (April 3 to 8) will take the form of a demonstration and show the application of the company's equipment to the measurement of the characteristics of a constant impedance low pass filter. The instruments used are the square wave and pulse generator, sweeping oscillator, and phase correction units. The characteristics, which are demonstrated in visual form, are (*a*) the amplitude/frequency, (*b*) the constant impedance, and (*c*) the transient.

Other equipment on show will include the Microsecond counter chronometer with which a practical demonstration of projectile velocity measurement will be given; the R.C. oscillator and automatic frequency monitor; mutual and self inductance bridge; wide range capacitance bridge; electronic frequency meter; and automatic frequency monitor (1Mc/s).

Also on show will be some of the latest photoelectric cells, including an ultra-violet multiplier, together with one of the new monoscope tubes now being manufactured.

▪

Equipment shown by the Baldwin Instrument Co. will include a beta-ray thickness or weight gauge which measures weight per unit area of sheet materials such as paper, cardboard, plastic, rubber, and metal foil by the absorption of beta radiation.

Another instrument, the beta-ray backscatter thickness gauge, measures weight per unit area of material having an appreciably different atomic number to its backing. The model shown is for gauging tin on steel. Similar equipment can measure plastic film on metal rollers.

The imposing façade of the new and additional Flexello factory which has recently been opened on the main Bath Road of the Slough Trading Estate.

▪

A single photocell instrument, the EEL flame photometer, for the rapid determination of potassium, sodium, calcium and lithium salts in solutions will be shown by Evans Electroselenium. The instrument is self-contained and ready for operation when connected to gas and air supplies and is suitable for use with town gas or any oil-derived gas, such as butane and propane, without any modification. Over a scale 12 cm. long, full scale deflection is obtained with ½ mg. sodium, 1 mg. potassium, 1 mg. lithium, 3 mg. calcium per 100 ml. and results are reproducible to within ±1 per cent.

Also to be shown is the colour temperature meter, a direct reading instrument not larger than the normal exposure meter for the easy and speedy determination of colour temperature of natural and studio lighting. In a matter of seconds it is possible to determine the quality of illumination, thereby ensuring that correct filters are used for colour film.

Contract for Quick Freezing Plant

A contract for the installation of a quick freezing tunnel complete with pre-cooler has been awarded to the S. B. Engineering Co. by Westwick Frosted Products. It is understood that the plant will be in operation in time for this season's soft fruit.

The whole installation has been designed with a view to adding a further blast freezer next year, and also additional sub-zero cold storage facilities.

Paint for Food Factories

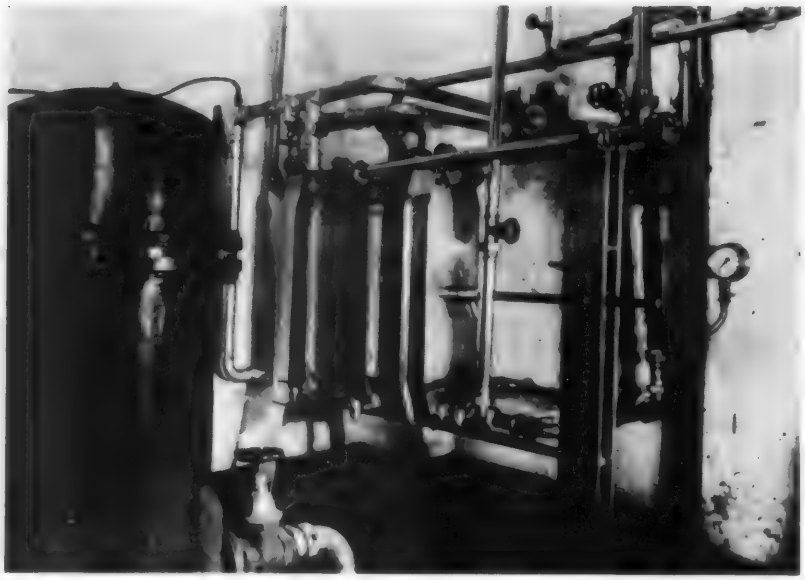
One of the features of a new paint, which will be of interest to those handling the preparation and storage of foodstuffs, is its lack of smell; another valuable property is its capacity to dry quickly, enabling two or more coats to be applied in an eight hour day, or overnight. These two properties suggest that the new paint will be invaluable to bakers, confectioners, and food manufacturers, who will be able to carry out maintenance painting without risk of contamination, while production continues uninterrupted.

Manufactured by Federated Paints, the new product is a vinyl emulsion paint which is durable and washable. As it dries and hardens it becomes completely insoluble in water.

From the decorative point of view it has an unusually attractive egg-shell finish which is smooth not only in appearance but also to the touch; it can be applied with confidence over distemper, paint, cement, new plaster, varnish, or even over creosote or bitumen. One coat gives exceptional obliteration and good covering. The smooth texture of the paint and fine flow properties result in freedom from brush marks. It can be applied quickly with a 6 in. brush without detracting from the quality of the finish, and is fire retardant, has good acoustic properties, and cannot by its nature encourage bacterial or mould growth.

Packaging Developments

Information about the latest activities of the Rival Packaging Division of The Oppenheimer Casing Co. (U.K.), including details of a new printed sausage casing and plastic food saver bags, is contained in the company's latest bulletin.



The duty of the Superplate plant consists of pre-cooling 750 gallons of wine per hour from 60°F. to 10°F. or 22°F., as the case may be, for subsequent cold room storage.

London's New Wine Treatment Plant

Established in 1868, the Emu Wine Co. has recently installed a new continuous cooling plant. To their premises in Bromley-by-Bow, where the new Cherry-Burrell plant is installed in one part of the bonded warehouse, vast quantities of wine are being regularly shipped from the company's own vineyards at Morphett Vale, Southern Australia, and Valencia, Western Australia.

The processing method devised by the management of the company, in consultation with Cherry-Burrell, calls for pre-cooling, heat regeneration, and chilling as the ideal requirements for wine treatment. At the same time, the equipment selected to take charge of all these duties had to be of the utmost versatility in view of the many different types of wine handled by the company. Maximum efficiency in flow arrangement, heat transfer, and temperature control are essential to preserve the natural fine flavour of the wine. The general principle underlying the carefully worked out pre-heating and cooling cycle is its stabilising effect on the wine.

The all-stainless Superplate plant is situated close to the huge, thermostatically controlled low temperature cold room, which contains 7 large storage tanks. On the other side of the heat exchanger are the storage vessels which are kept at room temperature. The duty of the Superplate plant consists of pre-cooling 750 gallons of wine per hour from 60°F. to 10°F. or 22°F., as the case may be, for subsequent cold room storage. Then the equipment takes charge of wine at a rate of 1,000 gallons per hour, coming in at between 5°F. and 10°F. and raising its temperature by a regenerative pre-heating process to 60°F. for storage at room temperature. Finally wine, at the same flow-rate, returns to the heat exchanger for final chilling, a process which is carried out partly by regeneration and partly by brine cooling.

In order to avoid a complicated system of changeover valves, Cherry-Burrell suggested that in the pre-cooling process the wine should be pumped through the entire plate sequence, although only the brine deep cooling section would then be effective.

Ancillary equipment included in this installation consists of a complete set of automatic, air-activated controls, a combined hot water circulating and cleaning unit, and a set of high capacity pumps and filters. Both the brine circulating system (for the deep cooling section of the heat exchanger) and the direct expansion refrigerating system for the cold room are also both operating under fully automatic control. All recording and control instruments, as well as all switchgear, are conveniently grouped on one panel, in the operational centre of the plant.

Increased Production Planned

In order to provide additional manufacturing capacity for their machinery building group, the Metal Box Company is to purchase from Crawley Industrial Products, their factory and engineering plant at Crawley, Sussex.

Tinplate Prospects

Speaking at the February meeting of the Eastern Regional Board for Industry, Mr. G. A. Haig, Eastern Regional Food Officer of the Ministry of Food, gave the official assurance that there would be no further reduction in the allocation of tinplate to food manufacturers in the Eastern region during the second quarter of the year.

He added that the allocation of tinplate for food generally would be greater in the second quarter of this year than at the comparable time in 1951 but pointed out that more tinplate would be required for milk in 1952 than last year; in consequence the allocation for fruit and vegetables would even out at approximately the same in the second quarter this year as last year.

New Packs for Squashes

Easy pouring, firm handling, and stability are the features of the new packs which have been designed for Keiller squashes. Made in two sizes, the bottles bear new labels and caps to tone with the colour of the fruit.

The new range of squash and cordial packs.

Biscuit Making Classes

The National Bakery School is proposing to commence a technical training course for biscuit makers beginning in September provided there is sufficient demand from the biscuit industry.

This course would probably involve attendance at the National Bakery School on one or two evenings per week during the autumn and spring terms.

Lectures on the raw materials used and demonstrations on methods employed in biscuit making will be given by Mr. J. Hall, a well-known baking teacher at this school and who was for some years connected with the biscuit making industry during his industrial experience.

Any firm or person interested in this proposed course of training should write to Dr. F. Aylward, at the National Bakery School, Borough Polytechnic, for further particulars.

Erections and Extensions

Plans have been drawn up by Norman Foods to extend their factory premises at Canning Street, Birkenhead.

*

Extensions to their biscuit factory at Brent Road, Southall, Middlesex, are to carried out by Kearley and Tonge.

*

Plans for a new factory on a site at Romford, Essex, have been made by the New Vita Biscuit Co.

*

The erection of a new factory at Suffield Street, Middlesbrough, is to be carried out by Greco Bros., wafer manufacturers.

*

Plans have been drawn up by Smith and Holbourne for the erection of a new fruit preserving factory on a site at Weasenham Lane, Wisbech, Cambs.

*

Two additional floors are to be erected by Carr and Co. at their factory at Caldewgate, Carlisle.

*

Approval has been received by McVitie and Price to provide a new bay at Levenshulme Biscuit Works, Stockport.

*

Plans to carry out extensions to their factory at Mottram Road, Hyde, Cheshire, are being made by Wall's.

*

Plans have been prepared by J. Lowrie and Co. for the construction of a new food packing station in Brinkburn Street, Newcastle-on-Tyne.

OBITER DICTA

• An acre of fresh water, planted with fish, can be made to produce more animal protein than the same area under pasture.—*FAO.*

• British farmers don't want subsidies or carrots to tempt them—all they want to see is politicians making up their minds.—*Mr. J. E. Bennion, President-elect of the British Friesian Cattle Society.*

You have a far better chance of filling up a Treble Chance coupon correctly than of finding a cigarette end in a loaf of bread, or of getting food poisoning.—*Dr. Alexander Hutchinson, Medical Officer of Health, Bolton.*

• Production both of food and manufactured goods can be increased substantially in this country alone, but it is less likely to be done by subsidies and other coddling than by freedom in production and marketing.—*"Milling."*

• As my hon. friend behind pointed out, the one-third pint is a rare bird, and only nests with retailers wedded to school supply, and the nearest thing you can get in terms of pint bottles to five times one-third is 1⅓.—*Mr. K. W. M. Pickthorn, M.P.*

• In very many cases boots are taken to these centres in a filthy condition and are then taken from these centres in bread baskets and other food receptacles, which are later used for the conveyance of bread to the various shops.—*Mr. W. G. Bennett, M.P.*

• While I pondered in a restaurant over my choice of soup the waitress said that the brown soup (6d.), kidney (6d.), and the oxtail (9d.), were all from the same pot. The difference in name and price, she said, was "to add a little variety to the menu."—*Correspondent to "Sunday Express."*

• As to the impossibility of buying sugar alone from Ireland, why should we attempt to? I expect it was "dollar" sugar originally anyway, and seeing that it is evidently surplus to Irish requirements, one must assume that it was purchased solely with a view to passing on to us at an extortionate price.—*Correspondent to "Grocer."*

BOOKLETS RECEIVED

The manufacture of Lustrex and its applications are described in a booklet published by Monsanto Chemicals.

*

The various applications of Alphanol 79 and Nonanol and their use in the manufacture of plasticisers are described in detail in a recent Shell Chemicals booklet.

*

The latest publication issued by the Kestner Evaporator and Engineering Co. describes the company's patent automatic gas washer.

*

To assist sign-writers working in factories, I.C.I. Paints Division has issued a leaflet which recommends and reproduces the Gill Sans Bold alphabet.

*

The full range of Safran centrifugal pumps is described in a booklet published by the Saunders Valve Co.

*

The evidence submitted by the Federation of British Industries to the Committee on National Fuel Policy has been published in book form.

*

A leaflet showing their range of mills and their application in different industries has been issued by Premier Colloid Mills.

*

The latest edition of the Procea magazine includes news of the social activities of the company's three factories at Colnbrook, Hanwell, and Irthlingborough.

COMPANY NEWS

The Directors of Beecham Group announce that they have declared a second interim dividend of 19 per cent. actual, less tax, on the Deferred Shares of the company in respect of the year ending March 31, 1952. This dividend is the same as the second interim dividend paid last year.

*

At the Board Meeting of George Cohen Sons and Co., held on February 12, 1952, it was resolved that an interim dividend of 8 per cent. actual, less tax, be paid on the £600,000 Ordinary Stock of the company on March 31, 1952, in respect of the company's financial year ending on that date and that the half-yearly dividend due on March 31, 1952, on the £1,500,000 4½ per cent. Cumulative Preference Stock be paid at the rate of 4½ per cent. per annum, less tax.

World Food News

Lyons International Fair

Eleven countries will be represented at the International Fair to be held at Lyons from April 19 to 28. Included in the wide range of equipment to be shown will be machines for chocolate and confectionery manufacture, hydraulic presses for plastics, machinery for the manufacture of macaroni, refrigerators, and machinery for butchers and provision merchants.

Intending British visitors can obtain further information from Robert Brandon and Partners, 47, Albemarle Street, London, W.1.

Irish Census of Distribution

Ireland is to have a census of distribution similar to that undertaken in Britain.

The Government is to issue to the distributing trade in Ireland 50,000 forms on which traders will have to enter a description of their business, a list of principal goods sold or services provided, number of persons employed, salaries and wages paid, rent and rates, values of sales, purchases, and stocks.

The results of the census of distribution will enable the Central Statistics Office to make more accurate estimates of the contribution of distribution to the national income and afford an independent check on estimates of national expenditure.

Industry in Under-developed Areas

The address delivered in Colombo last November by Mr. L. H. Manderstam, M.Sc., M.I.Chem.E., at the invitation of the Ceylon Association of Sciences, has now been published in the form of a 48 page booklet under the title "Pattern of Economic and Technical Improvements for Under-developed Countries, with special reference to Ceylon."

As consultant to the Government of Ceylon on a number of large industrial projects, Mr. Manderstam has been able to appraise the problems with which that country is faced in endeavouring to bring prosperity to the island.

The first section deals with the prevailing economic position of underdeveloped countries in general, characterised by their low productivity and poor living standards.

The remainder deals with the problem of obtaining the substantial capital needed for establishing new industries in such countries and includes some interesting information on such topics as fisheries, oils and fats industry, chemurgy, and the Colombo Plan which was launched in October, 1950.

Mr. A. R. Smith.

Packaging in America

Mr. A. R. Smith of The Automatic Weighing and Packing Machine Co. is to be present at the 21st National Packaging Exposition to be held at Atlantic City from April 1 to 4, where Chase Equipment Corporation, associates of the company, will be displaying their products.

Mr. Smith's address for contacts while overseas until the end of April will be c/o Chase Equipment Corporation, 47, East 19th Street, New York 3, N.Y.

Refrigeration in Road Transport

A complete cooling unit for truck trailer refrigeration has been developed by the Allen Cooler Division of the Production Planning Company of Detroit.

The company reports that a new pressure control valve that allows continuous operation at constant temperature is designed to prevent breakdown during transport, thus averting spoilage.

The Colombo Plan Exhibition

The Colombo Plan Exhibition, which was opened on February 16, was organised by the Ceylon Government to give expression to the Colombo Plan which grew out of the Commonwealth Foreign Ministers' Conference in Ceylon two years ago. The purpose of this plan is to raise living standards in the East with the aid of Western capital and their technical assistance.

The extension of liquid milk consumption is regarded as one of the most promising methods of improving nutritional standards and great interest is being taken in all schemes that further this end. In Colombo itself milk supplies up to Western standards have recently been made available by the Anglo-Ceylon and General Estates Co. from the Ayrshire and Jersey Tuberculin Tested herds on their Mahaberiatenne dairy farms.

This progressive company, with the co-operation of Gascoignes (Reading) and The A.P.V. Co. who have equipped the farm with milking and pasteurising equipment respectively, have organised a stand at the Exhibition which tells the whole story of clean, safe milk from the cow to the consumer. This display will have considerable educational value in a part of the world where safe milk is by no means taken for granted.

OVERSEAS ENQUIRIES

Cashew Nuts and Essential Oils

The Jacobs Candy Corporation, 827, Carondelet Street, New Orleans, La., have expressed interest in receiving quotations for the following:

Raw cashew nuts.—Fancy pieces and whole nuts, count 260 to 280 to pound, packed in 50 pound tins, two tins to the shipping case.

Essential oils. — Lemon, lime, orange, pineapple, flavours packed in ten pound tinned metal containers.

Foodstuffs exported to the United States have to conform to the provisions of the U.S. Food, Drug, and Cosmetic Act. Copies of the regulations of the U.S. Food and Drug Administration relating to foodstuffs are available for consultation at the Commercial Relations and Exports Department (Industries Branch) of the Board of Trade, Horse Guards Avenue, S.W.1.

Firms interested in this enquiry should address offers direct to Mr. Jos. Greene of the U.S. firm sending quotations in dollars c.i.f. New Orleans including packing charges, indication of delivery dates, and samples.

Laboratory Equipment

The head of the Department of Electrical Engineering in the University of Montevideo is interested in United Kingdom laboratory equipment, particularly electrical instruments, but does not receive trade literature from United Kingdom manufacturers.

United Kingdom firms interested in this enquiry should send full particulars of their products direct to the enquirer enclosing quotations c.i.f., indication of delivery dates, catalogues, and any other information likely to interest the enquirer.

Correspondence should be addressed to Prof. S. Gerszonowicz, Director del Instituto Electrotecnico de la Facultad de Ingenieria, J. M. Sosa 2185, Montevideo.

Glass Bottles

The Trade Administrator, 40, Harbour Street, Kingston, Jamaica, would be glad to hear from United Kingdom manufacturers who could supply Jamaica's requirements of bottles of various types (including bottles with applied letter colouring) and cartons.

Interested firms who can offer early deliveries should write direct to the Trade Administrator quoting reference G.1099/51 and giving details of the types of bottles they manufacture, together with prices and delivery dates. He will be pleased to refer local importers to responding firms who are not already represented in Jamaica.

*

Chocolate Bars

Pratt Representatives' (Newfoundland) Ltd., Water Street, St. John's, Newfoundland, a subsidiary of Steers wholesale organisation, are interested in obtaining an agency for the province of Newfoundland for chocolate bars. The company already hold several agencies for other United Kingdom products.

United Kingdom firms who are interested in this enquiry should communicate with the managing director, Mr. Hudson, giving particulars of their products.

Cat and Dog Foods

Eusenat and Co., Hibernia Bank Building, New Orleans, have expressed interest in receiving quotations from manufacturers of cat and dog foods packed in one pound tins or jars.

Firms interested in this enquiry should communicate direct with the U.S. firms forwarding samples of their products, and quoting c.i.f. prices in dollars and delivery dates. Firms are also reminded that dog and cat foods exported to the United States have to conform to the provisions of the U.S. Food and Drug Act.

*

Confectionery Lines

Hunt's Ltd., 67, Walker Avenue, Toronto, Ontario, wish to obtain agencies, for the whole of Canada, of United Kingdom manufacturers of any quality confectionery lines, particularly bars and bulk candy for bagging, etc., and hard candy items, such as quality toffees, which are not at present marketed in Canada.

The enquirers are confectionery manufacturers, bakers, and ice cream manufacturers and own a large chain of stores where their products and some other complementary candy lines are retailed. They have travellers and agents throughout Canada and also distribute their commodities through drug stores, department stores, high class confectionery stores and chain grocery stores, as well as through drug and confectionery wholesalers.

United Kingdom firms interested in this enquiry are reminded that the Canadian authorities require that, before foodstuffs or beverages are offered for sale in Canada, they must comply with the provisions of the Food and Drugs Act and the Regulations made thereunder and, where applicable, other measures designed to ensure the purity of imported or domestic food products. These provisions apply, *inter alia*, to (*a*) the product itself or the manner in which it may be prepared for sale, (*b*) the classes or descriptions of permitted colouring matter, (*c*) the uses of preservatives, (*d*) the manner in which products may be canned, (*e*) the particulars which must be shown on the labels or wrappings, etc.

Copies of the Food and Drugs Act and Regulations and connected legislation are available for consultation at the Commercial Relations and Exports Department (Industries Branch), Board of Trade, Horse Guards Avenue, London, S.W.1, and any United Kingdom firm which has not previously offered its particular products for sale in Canada is strongly advised to examine these enactments.

News from the Ministries

White Fish Authority

The Minister of Agriculture and Fisheries, the Secretaries of State for Scotland and for the Home Department, and the Minister of Food have appointed Mr. Arthur Ronald Booth of Armagh, Northern Ireland, to be an additional part-time member of the Scottish Committee of the White Fish Authority.

From 1930 to 1935 Mr. Booth was manager of an important sea salmon fishery on the County Antrim coast.

This appointment follows upon an Order in Council of October 4, 1951 (S.I. 1951, No. 1797), extending the jurisdiction of the White Fish Authority and its Scottish Committee to Northern Ireland.

Block Suet and Shredded Suet

The Food Standards Committee have recommended the introduction of a statutory standard for block suet with the following definition: "Block suet shall consist of beef suet rendered and free from fibrous tissue and shall contain not less than 99 per cent. by weight of beef fat."

The Committee recommend that the statutory standards for shredded suet contained in the Food Standards (Shredded Suet) Order, 1944, S.R. & O. No. 45, be revised as follows: "Shredded suet shall consist only of shredded, flaked, or otherwise comminuted block suet with farinaceous material and the proportion of fat shall be not less than 83 per cent. by weight."

Trade Agreement with Germany

Discussions for a new trade agreement between the United Kingdom and the Federal Republic of Germany were successfully concluded in London on March 4. The new agreement, which runs for a year from January 1, 1952, takes into account the changed positions in the European Payments Union of the United Kingdom and Germany since the signature of the trade agreement for 1951, as well as the measures of liberalisation of imports put into effect by Germany as from January 1, 1952.

The Federal German Government has increased certain quotas for imports from the United Kingdom and the Colonies substantially above the level for 1950, which was the last year of normal trading arrangements between the two countries; the quotas given by the United Kingdom Government for imports from Germany are for the most part based on the 1950 or 1951 agreements.

Under the agreement, United Kingdom exports to Germany will include woollen and cotton piece goods, other textile materials, miscellaneous chemicals, textile and office machinery, fresh and cured herring, and various consumer goods. Imports from Germany will include chemicals and dyestuffs, scientific instruments, and food and agriculture products. The German Federal Government has also substantially increased the quantities of steel which it will make available for export to the United Kingdom.

Some further progress towards the liberalisation of invisible transaction by the Federal German Government was also recorded in the agreement.

Biscuit Prices

Biscuit manufacturers are required to pay back to the Ministry of Food the subsidy element in the cost of the flour they use. An increase in this adjustment is required, and the increase of 1d. a lb. in the maximum retail price of sweet, semi-sweet, and chocolate biscuits takes account of this and also of increased costs of production.

The Minister of Food has already announced that the prices of other biscuits (rusks, matzos, unsweetened biscuits, dry wafers and, unless they are wholly or partly covered with chocolate, crispbreads, and oatcakes) will be freed from control.

Honey Marketing Standards

To meet requests received from beekeeping associations early in 1951, the Ministry of Agriculture and Fisheries set up an Advisory Committee on Honey Marketing Standards, representative of all sections of the industry, to consider reviving the voluntary commercial use by producers of national standard grades by honey producers in England and Wales. As a result of the work of the Committee, Marketing Guide No. 43 has been published.

Home-produced honey packed, on the responsibility of the industry itself, to the national recommended grades will be readily recognised by an identification mark on the jar label. The mark will appear either as a small separate label or incorporated in a private brand label.

The Federation of Bee and Honey Associations has recently been formed under the aegis of the British Beekeepers' Association, the Welsh Beekeepers' Association, and the Honey Producers' Association, for the purpose of supervising the commercial use of the national quality grades and the grades' identification mark. The Federation, acting through affiliated local associations, will be responsible for authorising the use of the national grades identification mark by individual members.

Import of Fruit Juices

The revocation of the Open General Licence for sweetened fruit juices consigned from the sterling area Muscat and Oman has had the effect of restricting the import of unsweetened fruit juices and those of low sugar content.

As the import of these types of fruit juice would not prejudice the United Kingdom supplies of raw sugar, the Board of Trade have further amended the Open General Licence with effect from March 12 to include fruit juices not containing more than 5 per cent. by weight of commercial sweetening matter, *viz.* sugar and invert sugar, honey, molasses, solid or liquid glucose, or any similar starch conversion products (*e.g.* malt syrup) or any mixture of such materials, if consigned from and originating in the sterling area Muscat and Oman.

Licences for imports from the sterling area Muscat and Oman of other types of fruit juice will be issued during the period ending December 31, 1952, so that the quantity which may be imported will be maintained at approximately the same rate as imports from these sources during the 12 months ended October 31, 1951.

Separate applications for these juices should be made on Form ILB/A (Revised) and addressed to the Board of Trade, Import Licensing Branch, Romney House, Tufton Street, London, S.W.1.

Importers should send with each application a statement of the quantity and value (c.i.f.) of their imports of these juices during the period November 1, 1950, to October 31, 1951; only those imports which were consigned from and originated in the countries concerned and which were paid for directly by the applicant to the overseas supplier should be included. Importers who have already sent statements of their imports of all fruit juices are now requested to send a revised statement showing only their imports of fruit juices other than those of the type now restored to Open General Licence.

Census of Production, 1953

Forms for the Census of Production to be taken in 1953 in respect of the year 1952 will contain fewer questions than in any previous census and "sampling" will be introduced for the first time.

These changes will reduce the burden on industry very substantially and permit the greatest possible economy in the Census of Production Office at the Board of Trade.

The census will cover all producing industries as before and returns will be required from all firms over a certain size in each trade. A "sample" will be taken of smaller firms, however, which means that the majority will not be required to make a return.

The information obtained from the sample will permit early estimates to be made of certain important aggregates such as total sales, materials used, stocks, and capital expenditure for each trade.

As a further economy, the sample enquiry into capital expenditure carried out by certain Government departments in 1950 and 1951 will not be made as the information will be quickly available from the sample census.

Home-grown Linseed

A minimum price of £65 a ton *ex* farm will be paid for home-grown linseed of 90 per cent. purity offered to, and accepted by, the Ministry of Food during the period July 1, 1952, to March 31, 1953. Appropriate adjustments will be made for seed of greater or less purity.

Actual buying prices will continue to be related to those which the Ministry would at the time be willing to pay for imported linseed or linseed oil and may be above but will not be below the minimum.

Until further notice, the actual buying price of linseed of 90 per cent. purity will be £72 a ton *ex* farm; the usual adjustments will be made for linseed of greater or less purity.

Dried Fruit from Australia

The surplus of dried vine fruits from the Australian 1952 crop is to be bought by the Ministry of Food. The surplus is estimated at from 30,000 to 40,000 tons. The prices to be paid are £98 10s. per long ton f.o.b. for sultanas and raisins, and £80 per long ton f.o.b. for currants.

The crop is now being harvested and shipments of the dried fruit should begin to arrive towards the end of June.

Import of Sugar Products

RESTRICTIONS EXTENDED TO STERLING AREA

Certain commodities containing sugar now require import licences irrespective of the country from which consigned.

The commodities involved are chocolate and caramel spread, honey cream spread, fruit juices and flavoured syrups containing not more than 65 per cent. of commercial sweetening matter, and sugar-fat mixtures containing between 10 per cent. and 65 per cent. of sugar.

Imports of these products from certain foreign countries were severely restricted by the November cuts.

The control of imports of these products from the sterling area is intended to prevent an increase in imports which might involve a reduction in United Kingdom supplies of raw sugar purchased from those countries under the Commonwealth Sugar Agreement, a reduction which could not be restored without dollar expenditure. The Colonial Governments concerned have been informed and raised no objection. Licences for imports from the sterling area will be issued during the period ending December 31, 1952, so that the quantity which may be imported will be maintained at approximately the same rate as imports from these sources during the 12 months ended October 31, 1951.

Importers should apply on separate forms ILB/A (Revised) for each of the different commodities to the Import Licensing Branch, Romney House, Tufton Street, London, S.W.1. They should send with each application a statement of the quantity and value (c.i.f.) of their imports of the commodity during the twelve months ended October 31, 1951; only those imports which were consigned from and originated in the countries concerned and which were paid for directly by the applicant to the overseas supplier should be included.

Goods which can be shown to have been *en route* before February 6 will be admitted without an import licence.

Information and Advice

This Service is available for subscribers to FOOD MANUFACTURE. Postal replies will be sent if a stamped, addressed envelope is enclosed with enquiries.

Cornflour Biscuits

B.5585. *Could you suggest a formula for biscuits, using cornflour?* (India.)

The following recipe for Soirée Biscuits is suggested as a basis for trial:

Soft flour	8 lb.
Cornflour	18 lb.
Sugar	1¾ lb.
Fat	3⅛ lb.
Salt	2 oz.
Egg	2¼ lb.
Ammonium carbonate	1 oz.
Essence of almonds	
Milk as required	

The mixture is made up into a clear biscuit paste and worked off as required into rich thin biscuits.

Levulose in Jams

B.5637. *Is levulose used in the confectionery, jams, and preserves industry, and if so, to what extent?* (London.)

Levulose, by itself, is not used to any extent in the confectionery and jam industries, but it is, of course, a part, with dextrose, as a content of invert sugar.

Corn syrup (glucose) could be used to the extent of approximately 10 to 12 per cent. calculated on the weight of the finished product.

Lemon Curd for Jars

B.5650. *Could you let us have a recipe for lemon curd?* (Lancs.)

We suggest the following as a basis for trial:

Eggs	8 lb.
Lemon juice	5 lb.
Sugar	20 lb.
Glucose	26 lb.
Margarine	10 lb.
Water	3 lb.
Citric acid	½ oz.
Salt	1 oz.
Oil of lemons	1 oz.
Colouring	

The fat is first melted in a pan, to which are added the lemon juice, sugar, and water. After whisking well together, the glucose, acid, salt, colour, and eggs are then added and the temperature of the mixture is slowly raised to 180° F. stirring being carried out continuously.

Information Supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery, and materials, and also general information as follows:

B.5536. *Sodium metabisulphite.* (Lincs.)
B.5537. *Metals in foods.* (Glos.)
B.5539. *Vacuum gauge.* (Canada.)
B.5540. *Aluminium foil envelopes and filling and sealing machines.* (Scotland.)
B.5542. *Meat slicing machines.* (Leics.)
B.5544. *Freeze drying.* (Berks.)
B.5545. *Wrapping table jellies.* (Devon.)
B.5547. *Dough dividers.* (France.)
B.5550. *Sweetened fat.* (Ireland.)
B.5551. *Yeast extract.* (U.S.A.)
B.5553. *Scientific instruments.* (Cumb.)
B.5556. *Curing bacon and hams.* (N. Ireland.)
B.5557. *Pressure cookers.* (India.)
B.5560. *Food standards.* (Kent.)
B.5562. *Sieving machine.* (Lancs.)
B.5573. *Turtle soup.* (Berks.)
B.5578. *Baking machines.* (London.)
B.5579. *Plastic buckets, monosodium glutamate, and preparation of tripe.* (Ireland.)
B.5584. *Spray drying of food products.* (Middx.)
B.5586. *Liquefaction of cornflour mixtures.* (London.)
B.5588. *Egg preservation.* (Ireland.)
B.5592. *Frozen meats.* (Ireland.)
B.5594. *Gravy powder.* (Herts.)
B.5596. *Preserved ginger.* (Leics.)
B.5600. *Table jellies.* (Ches.)
B.5605. *Fat treatment.* (Yorks.)
B.5606. *Pomegranate juice.* (Ceylon.)
B.5608. *Water-repellent silicone resins and electric heating mantles.* (Wigtown.)
B.5609. *Weighers and fillers for spice and capsuling machinery.* (S. Africa.)
B.5611. *Puffing of wheat and rice.* (Ches.)
B.5612. *Canning.* (Lancs.)
B.5613. *Sausage rusks.* (S. Rhodesia.)
B.5614. *Fondant.* (London.)
B.5618. *Monosodium glutamate.* (Jerusalem.)
B.5619. *Coffee measure.* (Australia.)
B.5621. *Artificial sausage casings.* (Greece.)
B.5622. *Second-hand equipment.* (Glam.)
B.5631. *Aluminium cans.* (Angus.)
B.5633. *Brominated vegetable oil.* (Lancs.)
B.5634. *Cream filling for wafer biscuits.* (London.)
B.5635. *Bottle capping.* (Lancs.)
B.5641. *Fat blenders.* (Ireland.)
B.5642. *Methyl ethyl cellulose and lactose.* (Lancs.)
B.5643. *Dried whey powder.* (Lanark.)
B.5644. *Canning plant.* (Portuguese India.)
B.5648. *Exports of pork products.* (South West Africa.)
B.5651. *Potato crisps.* (N. Ireland.)
B.5652. *Bottle sealing.* (Ireland.)
B.5653. *Automatic stirrers.* (Lanark.)
B.5657. *Vacuum closing machine.* (London.)
B.5660. *Butchery equipment.* (London.)
B.5663. *Literature on food values and vitamins.* (London.)
B.5664. *Metal caps for jam jars.* (Derby.)
B.5666. *Grinding mills.* (Glos.)
B.5667. *Glucose and malt syrup in jam.* (London.)
B.5668. *Cider and fruit juices.* (Australia.)
B.5670. *Sausage making, soft drinks, and preparing trotters.* (South Africa.)
B.5671. *Pumping of hams.* (Ireland.)
B.5672. *Suction plants.* (Warwicks.)
B.5673. *Glyceryl monostearate.* (Lancs.)

Recent Patents

666,130. IMPERIAL CHEMICAL INDUSTRIES, LTD., and POLLOK, F. J.: Compositions containing soapless detergents.
666,150. LARMUTH, A., and LARMUTH, L. J.: Wrapping machines
666,458. ROSS PRODUCTS, LTD.: Closure combined with a valve for bottles and other containers.
666,635. MARS, INC.: Method and machine for manufacturing candy bars.
668,394. MONSANTO CHEMICAL CO.: Method of and apparatus for densifying dry powdered solids.
668,465. PENNSYLVANIA SALT MANUFACTURING CO.: Apparatus for the production of fluorine.
668,534. TWIGDON, J. C., and MANN, H.: Machine primarily for treating beasts' gut intended for sausage skins.
668,570. MONO PUMPS, LTD., and ALCOCK, E.: Rotary pumps.
668,644. CLERK, R. C., and GODDARD, J. A.: Machines for grinding chocolate and other substances.
668,792. ARMSTRONG CORK CO.: Liners for container closures.
668,860. ROBINSON, K. A.: Closure caps for use in maintaining vacuum or partial vacuum in jars or bottles.
669,097. JAKES, J. H., and GRACE, I.: Wrapping machines.
669,363. MATTHEWS, S. E. (Hoffman, H. A.): Coatings for food products.
669,506. INDUSTRIAL AND COMMERCIAL DETERGENTS, LTD., and RESUGGAN, J. C. L.: Sterilising detergent compositions.
669,594. ALUMASC, LTD., and LEWIS, E. C.: Metal barrels and like metal containers.

Abstract of a Recent Specification

Glutamic Acid

The invention relates to improvements in the manufacture of glutamic acid and particularly *l*(+) glutamic acid, sometimes called d-glutamic acid, and is of especial value in the production of such a product by the acid hydrolysis of proteins.

The invention will be described particularly with reference to the production of this material from gluten, although it will be understood that it is applicable to other raw materials such as protein derived from soya beans which will respond to a similar treatment subject to any slight differences in procedure which will be recognised as desirable or necessary by persons skilled in the art.

The principal object is to provide a process of manufacturing *l*(+) glutamic acid in the raw or initial crystal form of such purity that no special or expensive purification step or procedure is required in order to obtain a product which is suitable for direct conversion into monosodium glutamate, which is the form in which the material is ordinarily marketed.

The process consists of producing *l*(+) glutamic acid by hydrolysis of a protein with sulphuric acid; this comprises the steps of adding to the acidic protein hydrolysate an alkaline earth metal oxide or hydroxide in an excess amount sufficient to bring the hydrolysate to a *p*H of between 10·5 and 11·5, removing the resultant alkaline earth metal sulphate precipitate, treating the remaining solution to effect the removal of the residual alkaline earth metal ions and to reduce the *p*H to a value at which amino acids having an isoelectric point above that of *l*(+) glutamic acid will crystallise. Throughout such treatment the *p*H is kept substantially above that which is optimum for the crystallisation of *l*(+) glutamic acid, allowing the amino acids other than *l*(+) glutamic acid to crystallise, removing such crystals, adding an acidifying agent to lower the *p*H of the solution to 3·2 so as to permit the *l*(+) glutamic acid to crystallise, and finally recovering the crystallised *l*(+) glutamic acid from the solution.

In a modification of the process according to the invention, sodium hydroxide is used in addition to the excess of alkaline earth metal oxide or hydroxide, to secure the desired *p*H of 10·5 to 11·5.

654,629. *Arthur Frederick Burgess.*

Trade Marks

BUSH.—691,418. Colourings for food and for beverages. **W. J. Bush and Company, Limited,** 28, Ash Grove, Hackney, London, E.8; Chemical Manufacturers.

CANDYCRAFT. — 692,616. Chocolate and non-medicated confectionery. **Candycraft, Limited,** Panton House, 25, Haymarket, London, S.W.1; Manufacturers.

RICH HARVEST.—700,357. Biscuits (other than biscuits for animals). **Meredith and Drew, Limited,** 351, The Highway, London, E.1; Manufacturers.

CRACKLUNS.—701,359. Cooked foods. **Painter Pure Foods, Limited,** 125, High Holborn, London, W.C.1; Manufacturers and Merchants.

EXTASE.—701,369. Cocoa, chocolate, and non-medicated confectionery. **Commanditaire Vennootschap Frank Rademaker's Cacao-en Chocoladefabriek** (personally responsible partners **Wilhelmus Johannes Josephus Maria Rademaker, Andreas Maria Rademaker,** and **Gerardus Maria Rademaker**), (a Limited Partnership established under the laws of Holland), Voorhaven 90, Rotterdam, Holland; Manufacturers and Merchants.

FAVELLA.—701,679. Preserved, cooked, or dried tomatoes. **Societa per Azioni Industrie Agricole Meridionali S.A.I.A.M.** (a Joint Stock Company registered under the laws of Italy), Via Salvatore Fusco, N5. Naples, Italy; Manufacturers and Merchants.

HAXOMINT.—701,872. Non-medicated mint flavoured confectionery. **Edward Hack,** Lion House, Red Lion Street, London, W.C.1; Manufacturer.

LYTOVIS.—702,007. Flour, preparations made from cereals for food for human consumption, biscuits (other than biscuits for animals), cakes, pastries, non-medicated confectionery, and baking powder. **Hovis, Limited,** 154, Grosvenor Road, Westminster, London, S.W.1; Millers and Manufacturers.

KREEMELLO.—702,189. Sugar confectionery and chocolate confectionery (none being medicated). **C. Kunzle, Limited,** 156, Broad Street, Birmingham, 15; Manufacturers.

SCOMAR.—703,167. Edible oils and edible fats. **The Southern Oil Company, Limited,** Westinghouse Road, Trafford Park, Manchester; Merchants.

Recent patents and trade marks have been selected from the "Official Journal of Patents" and the "Official Trade Marks Journal" and are published by permission of the Controller of H.M.S.O.

New Companies

Manchester Box and Canister Manufacturing Company, Limited. (503062.) Clough Canister Works, Moston Lane, Manchester. To take over business carried on as "Walkden, Son and Co., Ltd." at Manchester. Nom. cap.: £10,000 in £1 shares (8,000 red. pref.). Dir.: C. D. Walkden, 302, Whalley Road, Accrington, Lancs.

Cherril Products, Limited. (503541.) National Provincial Bank Chambers, Victoria Road, Surbiton, Surrey. To carry on business of confectioners, rock and chocolate manufacturers, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: E. J. Dickinson and Mrs. B. Dickinson, 23, Westville Road, Thames Ditton, Surrey.

Essdee Casings, Limited. (503711.) Victoria Spice Mills, York Road, Leeds, 9. To carry on business of manufacturers and importers of and dealers in sausage casings of all kinds, etc. Nom. cap.: £100 in £1 shares. Dirs.: P. Dalton and Marjorie Dalton, addresses not stated. Subs.: J. Dalton, Rigton Gates Farm, North Rigton, Huby, Leeds, and L. Newland, Strathmore, Barwick-in-Elmet, Yorks.

Sterns Food Products (Gateshead), Limited. (503735.) 144, Derwentwater Road, Gateshead-on-Tyne. To carry on business of manufacturers of and dealers in potato crisps and straws and potato products of all kinds, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: A. Stern and Mrs. P. Stern, 144, Derwentwater Road, Gateshead-on-Tyne.

Stokes and Dalton, Limited. (503736.) Victoria Spice Mills, York Road, Leeds, 9. To carry on business of manufacturers and importers of and dealers in cereal foods, health and dietetic foods and foodstuffs, etc. Nom. cap.: £100 in £1 shares. Dirs.: P. Dalton and Marjorie Dalton, addresses not stated. Subs.: J. Dalton, Rigton Gates Farm, North Rigton, Huby, Leeds, and L. Newland, Strathmore, Barwick-in-Elmet, Yorks.

Allied Canners, Limited. (503907.) Barclays Bank Chambers, High Street, Epsom, Surrey. To take over and hold shares, stocks, securities and interests in canning, food packing, and food preserving companies; to carry on business of canners, bottlers, and preservers of foodstuffs of all kinds, etc. Nom. cap.: £25,000 in £1 shares (23,000 red. pref.). Dirs.: to be appointed by subs. Subs.: R. W. Train (co. dir.), and J. G. Macpherson (co. dir.), Adelaide House, London Bridge, E.C.4.

Hartley Bros. (Fair Oak), Limited. (503961.) 12, Southgate Street, Winchester, Hants. To carry on business of manufacturers of and dealers in cider, perry, cordials, syrups, mineral and aerated waters, wines, beers, spirits, etc. Nom. cap.: £6,000 in £1 shares. Dir.: W. B. Hartley, Four Winds, Allington Lane, Fair Oak, nr. Eastleigh, Hants.

Frosfoo (Q.F.), Limited. (504613.) 46, London Fruit Exchange, E.1. To carry on business of packers and manufacturers of and dealers in frozen foods of all kinds, etc. Nom. cap.: £1,000 in £1 shares. Permt. dirs.: S. Wagner, 1, Renters Avenue, Hendon Central, N.W.4 (chairman), and M. Kutner, 5, Shaftesbury Avenue, Kenton, Harrow, Middlesex.

From Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.